EVENING AMUSEMENTS;

OR, THE

BEAUTY OF THE HEAVENS
DISPLAYED.

IN WHICH

SEVERAL STRIKING APPEARANCES,

TO BE OBSERVED ON VARIOUS EVENINGS IN THE

HEAVENS,

DURING THE YEAR

1809,

ARE DESCRIBED;

And several Means are pointed out, by which the Time of Young Persons may be innocently, agreeably, and profitably employed within Doors.

INTENDED TO BE CONTINUED ANNUALLY.

By WILLIAM FREND, Esq. M.A.

ACTUARY TO THE ROCK LIFE ASSURANCE COMPANY, AND LATE FELLOW OF JESUS COLLEGE, CAMBRIDGE; AUTHOR OF PRINCIPLES OF ALGEBRA, TANGIBLE ARITHMETIC, ESSAY ON PATRIOTISM, ETC.

Os homini sublime dedit, cœlumque tueri
Jussit, et erectos ad sidera tollere vultus.

LONDON:

PRINTED FOR J. MAWMAN, IN THE POULTRY.

1809.

ADVERTISEMENT.

THE reader is desired to recollect, that in the volume for 1806 is given a description of the positions of the stars for certain hours, in every night, which is referred to continually in this volume; so that, whatever may have been done with the other volumes of the series, the volume for 1806 is essentially necessary, and should be frequently in his hands. The plan pursued is similar to that of the former volumes; and as he will, by noticing the motions of Jupiter and Venus at night, in the beginning of this year, form an idea where they are during the day, he may discover them perhaps, notwithstanding the brilliancy of

the Sun. Sufficient attention has not been paid to the times, when Venus is visible during the whole day, which are perhaps more frequent than is generally apprehended.

EVENING AMUSEMENTS;

OR, THE

BEAUTY OF THE HEAVENS

DISPLAYED.



TO THE READER.

THE plan of my work is now so well known, that little need be said of it: yet I cannot permit this volume to go out of my hands, without insisting upon my previous hints, that the former volumes are not to be neglected. The one for 1806 will be as much wanted in this, as in the preceding year; and directions are given for the use of it at the end of each month in this volume. It might be expected, that to many persons all the principal stars will be now sufficiently known; but new readers are daily arising, and they will require such an introduction: and besides, the persons who are already acquainted with the stars

are best able to assist their friends in the use of the volume for 1806, and to shew them with what ease such a knowledge may be acquired.

We have not a comet to dilate upon this year, though the newspapers have announced them, not being sufficiently acquainted with the difference between meteors and comets. My readers however are not likely to make such a mistake. They know at what an immense rate a comet is moving, though its motion is not apparent to the naked eye; and they cannot confound such a body with a passing meteor, which darts with rapidity through the sky, and is but a few miles elevated above the earth. We may hereafter enquire into the greatest height these meteors have attained; which it would not be difficult to ascertain, if the places where they were seen were always known. But many a meteor passes unnoticed; and they, who see them, are not sufficiently attentive to the places in the heavens where they appear, and the stars by which they moved.

We shall have sufficient call for our patent paper and our pasteboard and beads this year. I presume that many of my readers are prepared

with these articles. The specimens I have seen, of the use made of them by some young persons, has afforded me great satisfaction; as I am convinced that this will encourage others, and the knowledge of the heavenly bodies will become more and more familiar in this country. It is particularly satisfactory to me, that the science of astronomy is thus taught in an easy manner in several ladies' boarding schools. The exercise will be of use to them, and in future life persons so educated will derive the advantage of it.

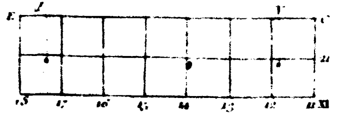
I shall beg of my reader to consult the beginning of the last year's volume, to discover in which party he is to class himself, that of the active or the passive minds. It is doubtless more pleasant to me to go on with an active, but I have amusements for the passive minds. All have their use in this great theatre, in which we are placed: and it is much too apparent, that many of our active minds find now employment, which, when the world has got out of its leading strings, will do them little honour. The cultivation and improvement of the earth will be more valued in a future time, than at present are the works of destruction: yet the latter are sometimes necessary, and they are necessary, because man

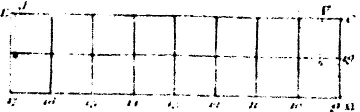
has forgotten his rational duties; and before he can be brought back to them, much calamity must be endured. How powerfully should this operate upon us all, to endeavour, by every means in our power, to assist the rising generation in the acquisition of knowledge and virtue! Not all are expected to pursue the course I am now recommending: yet, if all cannot be proficients in the knowledge of the heavenly bodies, in one branch of knowledge a deficiency must be ever a reproach and a calamity: for in a country like this, where the book of true wisdom is open to all, how highly negligent must those be, who do not take the proper pains to make themselves fully acquainted with the life and doctrines of their Saviour.

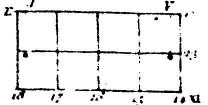
I have acknowledgements to make to several correspondents for their very useful hints; and I must not omit the opportunity of thanking the gentleman, who in the Monthly Repository has given so publick a testimony to the advantage he derived from the perusal of my books, and pursuing the plans laid down in them. His letter was put into my hands by a constant reader of that publication; and I trust that this volume will continue to afford him amusement. The endless

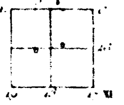
variety in the heavens cannot fail of producing it; and it is sufficient that the three brightest planets will be above the horizon, all at the same time in the same evenings, to call the attention of my readers to the previous remarks that have been made on them, and to excite them to form a true idea of their different motions.

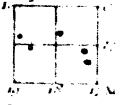
PLATE I

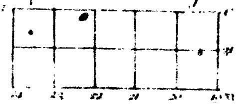


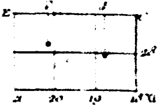


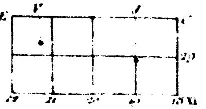


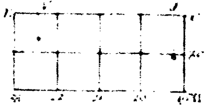


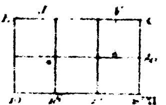












1809



JANUARY, 1809.

MANY persons learn astronomy merely by books. They are acquainted with the motions of the planets round the Sun; and understand that they are performed in orbits nearly circular: but when they are desired to lift their eyes to the heavens, and, from the apparent motions of the planets perceived in several successive evenings, to delineate their real motions, they are perfectly at a loss; and very often have not the least idea of the planet by the sight of it, and are totally unacquainted with the stars by which it passes. On this account I am persuaded, that every person, who wishes really to understand astronomy, should take a very different mode, and after observations of the motion of the Moon and planets in the heavens, learn to trace out their courses. They, who have read my preceding volumes, will I think be of my opinion; and the motions of two planets this month, and three the next, will throw great light upon this subject.

JANUARY, 1809.

In this month Venus and Jupiter are to be seen in the evening; Venus on the 1st, being twenty-five degrees to the west of Jupiter. Of course they are both to the east of the Sun, who is thirty-seven degrees from Venus. Thus the position of the two planets with respect to the Sun is ascertained; and though we might not be able to tell the exact distance in degrees of one from the other, yet from a little observation of the distance of the planets from the point in the horizon where the Sun sets, we should not err much in placing them on our pasteboard*. To do it exactly, we may place our earth bead and circle round it, so that the Sun shall be in the tenth sign ten degrees and three quarters. Then fix the bead for Venus in her circle in the eleventh sign seventeen degrees and three quarters, and the bead for Jupiter in the twelfth sign thirteen degrees thirty-five minutes.

No difficulty occurs with respect to Jupiter, for he is evidently near his conjunction; and as he has but one conjunction, this point cannot in his case be mistaken†. But Venus has two conjunctions, a superior and an inferior conjunction; and the line drawn from the Earth to Venus,

* See volume for 1807, pages 199, 200. † Ibid. page 73.

may pass through the same point in the heavens in either case. We cannot therefore know from the directions, as yet given, whether Venus is in the upper or lower part of her orbit; nor do we know whether she is moving towards or from one of her conjunctions. She is to the east of the Sun; and must, when we observe her, be moving either from her upper conjunction, or be stationary, or moving towards her lower conjunction. This you well remember, as the planets are all moving from west to east in their orbit. If an inferior planet is observed to increase its distance from the Sun, it must be moving from the conjunction; if the distance from the Sun is decreasing, it must be moving towards the conjunction.

We have now then to observe, whether the distance of Venus from the Sun is increasing or decreasing: but this will not tell us from or to which conjunctions she is moving. Our pasteboard informs us, that when we look at Venus, and the Sun near the superior conjunction, if she is moving towards that conjunction, she is to the west of him; and if from that conjunction, to the east of him; that is, if her distance from the Sun is decreasing, when she is near her superior conjunction, she is moving towards it; but if

increasing, she is moving from it. In a similar manner, if she is moving towards her inferior conjunction, she is to the east of the Sun; and if from that conjunction, she is to the west of him: that is, if her distance from the Sun is decreasing she is moving towards; and if increasing, is moving from that conjunction.

We have at this time one point only ascertained with respect to Venus; namely, that she is to the east of the Sun. It requires some nights' observation to tell, whether she is moving from the Sun or not: but this point will be settled in a week's time; for though there is not a very great difference in the time that she appears above the horizon after Sun-set on the 1st and 7th day, yet that difference is in favour of the increasing length of time. Had Venus been moving towards the Sun, her line above the horizon after Sun-set would be gradually decreasing. Of course we conclude, from observations in the former part of this month, that Venus is moving from the Sun; and as she is to the east of the Sun, she must be now moving from her upper conjunction to her point of greatest elongation.

The motion of Jupiter is much easier ascer-

tained, though it varies very little compared with that of Venus. Jupiter is now about sixty-three degrees from the Sun; of course he is near to his conjunction. He is to the east of the Sun, and his time of appearing above the horizon after Sun-set is daily decreasing. Of course the Sun is apparently moving towards him; though we know, that it is the Earth, which is moving, and this makes the apparent motion of the Sun towards him. Of course his conjunction with the Sun is approaching: and we know how to place his bead upon the pasteboard; namely, near to the conjunction, but to the east of it.

The motions of Jupiter and Venus being both near a similar conjunction; namely, Jupiter near the only conjunction it has, and Venus near its upper conjunction, must be direct; as we know from our pasteboard and planet beads. But Venus moving so much faster than Jupiter, it is not at all surprising, that she is every day gaining ground on him; and that, though on the 1st she is to the west, she will before the end of the month be to the east of him. The hour, on which she is nearest to him, may be ascertained; and as my prints are too small to shew this with

sufficient accuracy, I shall at the end of this volume give the places of these two planets, so as their situation every night may be delineated on the patent paper. My readers will take what scale they please, and will find some amusement in seeing how the distance of the two planets each night corresponds with their delineations.

The Moon in its path, this month, passes by two planets, which occupy deservedly the attention of astronomers; these are Herschell and Saturn — Herschell on the 10th, and Saturn on the 12th. Both I presume are by this time known to many of my readers; and they, who have not yet discovered them, must leave their beds in the morning some time before Sun-rise to avail themselves of this opportunity of examining with their telescopes these planets, when their places in the heavens has been determined, and the Moon's light ceases to overpower them. On the 1st is full Moon, at fifty-three minutes past nine after noon; but there is no eclipse, as at that time she is in her upright, upwards of four degrees south of the Sun's apparent path, or the eclipticк. At this time she has around her many glorious stars, which suffer by her superior

splendour. Almost under her, but to the west and near to her, is the third of the Twins; and under her also, but at a considerable distance, is Sirius, the brightest star in the heavens. Orion is near to the meridian, but to the east of it. From the time of the Moon's rising, the eastern horizon presents well-known objects. Rising nearly with her, are the two first stars of the Twins to the north; and the first and third of Orion to the south of her. Venus is now setting in the south-west, and Jupiter is near to, but to the east of, the meridian, under the two western of the four stars in Square. As she rises in the heavens, the whole of Orion gradually displays himself, and under her are the two first stars of the Lesser Dog. At midnight the heavens are losing Jupiter, who is setting nearly in the west. The Moon has directly under her, at a considerable distance, Sirius; both being near the meridian: and the circle around her—formed by the two first stars of the Twins; the two first of the Lesser Dog to the east; Sirius, Orion, the Bull, and Capella, to the west—will present, if the night is frosty and serene, delightful objects. As she descends, Mars is seen to rise. At nine she is forty-six degrees forty minutes from the first of the Lion, to the east of her; and at six

thirty-one degrees fifty-six minutes, and at nine thirty-three degrees twenty-eight minutes from Aldebaran, or the first of the Bull, to the west of her.

On the 2d she is seen at her rising under the two first stars of the Twins, having removed considerably from the third of this constellation; and as she mounts the heavens, is perceived to be between the two first stars of the Twins and the two first of the Lesser Dog. At nine, she is thirty-four degrees nineteen minutes, and at midnight thirty-two degrees forty-six minutes, from the first of the Lion to the east of her; and at six forty-four degrees twenty minutes, and at nine forty-five degrees fifty-four minutes from Aldebaran, or the first of the Bull to the west of her. On the 3d she rises still under the two first stars of the Twins, but at some distance from the line passing through them and produced. The small stars with the nebula of the Crab near to her will be eclipsed by her superior splendour. As she mounts the heavens, the rising of the Lion will call our attention. At nine she is fifty-eight degrees thirty-three minutes, and at midnight sixty degrees eight minutes, from Aldebaran to the west of her.

On the 4th she rises under the two first stars of the Crab, having passed very near to them before Sun-rise in the morning. As she mounts the heavens, we perceive, that she is approaching the Lion, and is directing her course under that constellation, passing the line between the first of the Lesser Dog and the first of the Lion before midnight. At nine she is seventy-one degrees twenty-three minutes from Aldebaran. On the 5th she rises under the first of the Lion; and as she mounts the heavens, this star, with her, Mars, and the first of the Virgin, form a line which will excite attention. At nine she is forty-two degrees fifty minutes, and at midnight forty-four degrees twenty-five minutes, from the second of the Twins. On the 6th she rises under the body of the Lion; and, as she mounts the heavens, is seen to have receded considerably from the first of the Lion, and approached towards but is still nearer to the star than the planet Mars. On the 7th she rises under the second of the Virgin, almost in a line with that star and the second of the Lion. As she mounts the heavens, we perceive that she is much nearer to Mars than to the first of the Lion, and her approach to the planet and to the first of the Virgin excite attention.

On the 8th the Moon rises nearly at the same time with Mars, and they are soon after followed by the first of the Virgin; and this groupe will excite attention during the morning of the 9th. On the 10th she rises in the morning at a considerable distance under the first of the Virgin and Mars, having passed near to the star about noon of the preceding day. She is soon followed by Herschell, who is near to the first of the Balance; and towards whom she is now directing her steps. On this day she passes the Sun's path, but from her age cannot evidently suffer an eclipse. On the 11th she rises under the first of the Balance and Herschell, having passed the planet at forty-three minutes past six of the preceding evening, and the star at three quarters before one of this morning. About an hour and a half after rises Saturn; and before Sun-rise the line drawn from Mars, by the first of the Virgin, the first of the Balance, the Moon, the second of the Scorpion, Saturn, and Antares, will be pleasing to those, who are travelling, or can rouse themselves so early on a winter's morning. On the 12th she passes over the second of the Scorpion, her eastern limb touching the star at fifty-two minutes and a half past four in the morning, the star being two minutes and a quarter north of the

Moon's center; and the star emerges from the western limb at fifty-seven minutes and a half past five, being then three minutes north of the center. As the immersion takes place soon after Moon-rise, and at such a time of the morning in such a season of the year, few persons will give themselves the trouble of examining it. During this time Saturn will be observed to be very near to the Moon as she passes him at ten minutes past seven of this morning. On the 13th she will be perceived to have receded very considerably from the second of the Scorpion and Saturn, and to form with this star, the planet, and Antares, a pleasing groupe. The distance will be farther increased on the 14th, and we shall leave her to her course, wishing for her appearance after the renovation of her light.

The new Moon is on the 16th, at nine minutes past one in the morning: but there is no eclipse, as she is nearly five degrees in her upright, north of the Sun's apparent path on the eclíptick. On the 17th we shall observe her fine crescent soon after Sun-set, near south-west by west, and near the horizon. On the 18th we shall perceive her under the four small stars in triangle of the Water-pot, and of course considerably below the four stars in Square: Venus and Jupiter now form

with the Moon an interesting scene, Venus being the nearest to her. At six she is sixty-one degrees and a half from the first of the Ram to the east of her. On the 19th, the progress of the Moon by the two planets Venus and Jupiter will appear to have been considerable; and the groupe is still interesting, Jupiter being now the nearest to her. Above her are the four stars in Square; but she has passed the line drawn between the two westernly of these stars and produced. At six she is eighty-one degrees and a quarter from Aldebaran, or the first of the Bull.

On the 20th the two planets Jupiter and Venus are considerably below the Moon, Jupiter being the nearest to her; and she is still under the four stars in Square, but has not reached the line drawn through the two eastern of these four squares and produced. At six she is sixty-eight degrees and a half from Aldebaran, and at nine sixty-six degrees fifty-seven minutes from this star, who is to the east of her. On the 21st, at six, she passes the fourth star of the Fishes, having passed, and being considerably removed from, the line drawn through the two eastern of the four stars in Square. Above her are the three first stars of the Ram, and below the two planets Jupiter and Venus; and at this time she

is fifty-six degrees seven minutes, and at nine fifty-four degrees thirty-five minutes from Aldebaran to the east of her. On the 22d, she is on the meridian at five minutes past five, the three first stars of the Ram being above her to the east of the meridian; and Jupiter and Venus form a conspicuous figure nearly half way between her and the horizon, in a line drawn to the south-west. The approach of Venus to Jupiter cannot fail of striking the observer. At six she is forty-four degrees from Aldebaran to the east of her, and at nine forty-two degrees and a half from this star.

On the 23d, the Moon is on the meridian at forty-nine minutes past five; and on this day she passes the Sun's path, going from the north to the south of it: but there is no eclipse, as she is so far from the full. When on the meridian, we observe above her to the west the three first stars of the Ram, and below her Menkar and the stars in the head of the Whale to the east of the meridian. She is directing her course towards Aldebaran; and at six is thirty-two degrees five minutes, and at nine thirty degrees thirty-six minutes from this star; and from the first of Pegasus she is distant, at six, forty-

seven degrees forty-seven minutes; and at nine, forty-nine degrees ten minutes. On the 24th, she is on the meridian at thirty-four minutes past six, Menkar being now directly below her; and above her, to the east of the meridian, are the Pleiades; and to the west, the three first stars of the Ram. Before this time the least attentive observers will have noticed the two bright planets Jupiter and Venus near to each other in the western hemisphere. At six the Moon is sixty-three degrees thirty-four minutes, and at nine sixty-two degrees eight minutes, from the second of the Twins to the east of her; and at six she is fifty-eight degrees fifty-six minutes from the first of Pegasus.

On the 25th, the Moon is on the meridian at twenty-one minutes past seven, being near the line between the Pleiades and Aldebaran, the former stars being above her to the west, and the latter star below her to the east of the meridian. At six she is fifty-two degrees four minutes, and at nine fifty degrees thirty-eight minutes, from the second of the Twins to the east of her; and at six seventy degrees thirteen minutes from the first of Pegasus to the west of her. On the 26th she is on the meridian at

eight minutes past eight; and it is to be hoped, that the former part of the evening will be fine, that astronomers and others may be gratified with the near approach of Jupiter and Venus to each other, the distance between them being little more than sixteen minutes, Venus being to the north. Above the Moon to the east is seen the second of the Bull, and below her to the west but near to her Aldebaran. Orion now below her to the east of the meridian makes a conspicuous figure. At nine she is seventy-four degrees and three quarters from the first of the Lion to the east of her; and at six thirty-eight degrees, and at nine thirty-nine degrees twenty-seven minutes, from the first of the Ram to the west of her.

On the 27th the Moon is on the meridian at fifty-seven minutes past eight, reigning now paramount in the heavens, no planet displaying its light. Under her is the splendour of Orion, and near to her on the west is the sixth of the Bull, above the second; of course Aldebaran and the Hyades are to the west. The two first stars of the Twins are above her to the east, and the third of the Twins with the two first of the Lesser Dog and Sirius adorn the eastern hemisphere at some distance from the meridian.

At six, she is forty-nine degrees forty minutes, and at nine fifty-one degrees nine minutes, from the first of the Ram to the west of her; and at nine, she is sixty-two degrees forty-six minutes from the first of the Lion to the east of her. On the 28th, she is on the meridian at forty-six minutes past nine, having nearly directly under her the third of the Twins, and much lower down Sirius and the second of the Greater Dog. The two first of the Twins are above her to the east, and Orion below her to the west of the meridian. At nine she is fifty degrees thirty-five minutes from Regulus, or the first of the Lion east of her; and at six she is twenty-eight degrees one minute, and at nine twenty-nine degrees thirty-three minutes from Aldebaran to the west of her.

On the 29th, the Moon is on the meridian at thirty-six minutes past ten, having directly above her the two first stars of the Twins, and directly below her the two first of the Lesser Dog. During the night her position between these pairs of stars will be noticed. At nine she is thirty-eight degrees twelve minutes from Regulus or the first of the Lion, and at six is forty degrees twenty-five minutes; and at nine

forty-one degrees fifty-nine minutes from Aldebaran to the west of her. On the 30th the Moon is on the meridian at twenty-five minutes past eleven, having above her the two small stars with the nebula in the Crab, and below her the small stars in the head of the Hydra; but her splendour will scarcely permit them to be visible. To the east of her at some distance is the first of the Lion; and near the horizon, by east-south-east, Mars and the first of the Virgin. At six she is fifty-three degrees six minutes, and at nine fifty-four degrees forty-two minutes, from Aldebaran. On the 31st is full Moon at eight minutes past two after noon, but there is no eclipse, as the Moon is nearly five degrees in her upright south of the Sun's apparent path, or the ecliptick. She is followed soon after her rising by the first of the Lion, but she has not reached the line between the first of the Lesser Dog and this star, though she passes it before Sun-rise. At six she is sixty-six degrees three minutes, and at nine sixty-seven degrees forty-two minutes, from Aldebaran, who is to the west of her.

Mercury is in his superior conjunction at one o'clock after noon of the 19th, and so near

to the Sun during the whole month, that he will not be seen by any, except the keen astronomer, during this month.

Venus and Jupiter are evening stars. Venus has a direct motion through nearly twenty-eight degrees, being on the 1st in the tail of the Goat, near to the third and fourth stars of this constellation. The third she passes on the 2d, this star being three quarters of a degree south of her; and on the 3d she passes the fourth, this star being forty-eight minutes to the south of her. If the weather is clear we cannot fail of marking these stars during the three or four first days of the month. On the 12th she is nearly in the line with the first and eighth of the Water-bearer, and on the 18th she passes the eleventh of this constellation, the star being fifty-three minutes north of her. On the 23d she is in contact with the twenty-first of the Water-bearer, and on the 27th she passes Jupiter in a barren region, being only sixteen minutes to the north of him. The Moon passes her on the 19th in the morning; she sets on the 1st a little past seven, and on the 26th about twelve minutes past eight. This month is of course particularly favourable for observations upon her.

Jupiter is an evening star, much longer visible in the heavens in the beginning, than during the latter part of the month. He passes through somewhat more than six degrees and with a direct motion. On the 6th he passes the twenty-first of the Water-bearer or star at the edge of the stream of water supposed to issue from the Water-pot, the star being eight minutes north. The Moon passes him on the 19th.

Mars passes over the meridian on the 1st at six in the morning, and on the 25th at forty-eight minutes past four, and of course he may be considered as a midnight star. On the 1st he rises about midnight near east by south, and on the 25th about a quarter past eleven. His motion is direct through eleven degrees and a half, being on the first between three and four degrees from the third of the Virgin; and of course, as he mounts the heavens, he is seen under the five stars in triangle of the Virgin, having under him the first of the Virgin; and he finishes his course a little beyond this latter star, when they rise nearly at the same time, and are about four degrees and a half distant from each other. The Moon passes him on the 9th.

Saturn and Herschell are morning stars. Saturn is on the meridian on the 1st about nine in the morning, and on the 25th at twenty-eight minutes past seven. He rises on the first at about three quarters past four, near south-east by east, and on the 25th at a quarter past three. His course is direct through two degrees and three quarters, passing on the 6th the second of the Scorpion, at the distance of only fifty-four minutes, the star being south of him; and on the 24th, the thirteenth of this constellation, the star being eight minutes south of him. Of course his progress by a star of the second magnitude will make it very discernible, and the planet with the two first stars of the Scorpion will form a pleasant groupe. The Moon passes him on the 12th.

Herschell is on the meridian at forty minutes past seven, and rises about three quarters past two in the morning of the 1st; and on the 22d is on the meridian at twelve minutes past six, and rises at forty minutes past one in the morning. He moves directly through only three quarters of a degree, being near to his stationary point; and the first of the Balance, which rises soon after him, is a sufficient di-

rection to him. From this star he is at first distant about three degrees, being in a line nearly with this star and the tenth of the Virgin. The Moon passes him very nearly on the 10th, at forty-three minutes past six in the evening.

The apparent diameter of the Sun decreases, being on the 1st thirty-two minutes thirty-five seconds; and on the 25th thirty-two minutes thirty-two seconds. The apparent diameter of the Moon first increases and then decreases. On the 1st, it is thirty minutes four seconds, which is so near to half a degree, that we may notice its size particularly during its long day: it increases to the 13th, when it is thirty-two minutes fifty seconds: from this time it decreases to the 25th to twenty-nine minutes thirty-eight seconds, and then increases to the end of the month, when it is thirty-one minutes and six seconds.

For the appearances of the fixed stars we consult the volume for 1806. The day of the month, in the following table, is in the upper line, and under it the hour, in a line with which is in Roman characters the number of the position described. Thus, if you observed any particular

star at ten o'clock at night on the 8th of this month, you look to the top line of figures, where is to be found the figure 8 denoting that day; under it in the line under the letter h marking hours is the figure 10, and in the line under Pos. or Position, is the Roman character I. marking the first position. Of course you look for the description of the first position in the volume for 1806; and in it you will find described the position of any remarkable star about ten o'clock at night. If you want to consult the position for any hour or day not marked in the table, look to the two positions near the time; as for example, for an object seen on the 12th at six in the evening. It appears by the table, that on the 8th, for six in the evening we should consult the eleventh position, and on the 16th we should consult this position at thirty-nine minutes past five. In the intermediate time, therefore, the 12th day at six in the evening, this position will tell us sufficiently nearly the place of the object. I have already observed, that the volume for 1806 is become peculiarly necessary, as references are continually made to it.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
X.	4	43	4	12	3	38		
XI.	6	44	6	13	5	39	5	5
XII.	8	50	8	19	7	45	7	11
I.	10	40	10	9	9	35	9	1
II.	0	43	0	12	11	38	11	4
III.	2	32	2	1	1	27	0	53
IV.	4	53	4	22	3	48	3	14
V.	6	44	6	13	5	39	5	5
VI.			8	9	7	35	7	1

FEBRUARY, 1809.

WE have seen in the last month two planets of superior brilliancy decorating at the same time the same part of the heavens, and the inferior passing the superior planet within a less distance than the Moon's semi-diameter frequently extends to our eye. In the one case, namely that of the superior planet, he shone with a full orb upon us: the inferior planet shewed to us a part only of her enlightened orb. To make this phænomenon appear to still greater advantage, the two planets should pass each other, when the splendour of each is the greatest. That of Jupiter is not susceptible of very great variations: in Venus they are very observable. The portion of her orb, illumined by the Sun, was decreasing during the whole of the month: but at the same time her distance from us was decreasing, so that her splendour upon the whole of these two considerations was increasing every night. If then in her passage by Jupiter she far outshone him, her comparative bril-

liancy would have been much the greater, if she had passed him at the time that her splendour is the greatest. This time occurs twice between two superior conjunctions; namely, once in going from her superior to her inferior conjunction, and once in going from her inferior to her superior conjunction. The reasons for this will occur to you, on considering in what manner the appearances of her orb is daily changing, and how her distance is varying.

Our climate is not favourable to these observations, but we may easily imagine how much greater is the impression made by these bodies on the countries, which enjoy a clearer sky, and where an inferior planet at the same time in the evening is so much higher above the horizon. As we measure the year by the time in which the Sun appears to have made its progress from one point in the heavens to the same again, so the astronomers of the east may have delighted in these conjunctions of two planets, and observing the times between them. This would lead to the conjecturing of the interval between the conjunctions of three planets; and so on, till at last they would examine how much

time has elapsed since the Sun, the earth, and planets, were in one straight line, and how much will elapse till again they come into a similar situation.

A man, who has been accustomed to think of himself only, and to imagine what an important being he is in the universe, is quite lost, when he hears us talk of millions of millions of years, and to speak of phænomena to take place at very distant intervals, of which he cannot bring himself to form any conception. To him threescore years and ten is a long period to look at; and he is humbled with the thought, that all his imaginary consequence will so soon vanish; and that, whilst he is placing his enjoyments in the trifling concerns of this life; such as magnificent palaces, fine pictures, great armies, extensive domains, and the like—which are all of them worse than trifling, if the mind of the possesser is corrupted—others are contemplating periods, when vice shall cease to bear sway, and man shall act up to the principles of a rational being, capable of all the enjoyments which wisdom and virtue can afford.

But the contemplation of the long periods,

formed by the intervals between certain phænomena of the heavens, has led, and may lead, to very false conclusions. The year of the philosopher may be enlarged far beyond that of the common mind. He may talk familiarly of different intervals of very great extent, and fraud and superstition may abuse those thoughts, which, properly conducted, could lead only to good results. Thus the eastern astronomers probably gave names to various conjunctions. Superstition annexed certain actions to them: fraud played upon the disordered imagination; and European philosophers have been found to exalt eastern tales above the truth and sublimity of divine revelation. If we go back to the first existence of man on this little ball, in which he has contrived so many means of tormenting himself; we find, by the light of revelation, that very few years have elapsed: with eastern tales this is not to be reconciled; and without any real documents of history, are we to lay aside our bibles for the dreams of an idle philosophy?

It is not improbable, that, as our knowledge of the east increases, we may find some useful facts in astronomy ascertained: but, as to any

other advantage to be derived from our enquiries, we must look to other quarters. The science of astronomy commenced probably in the plains of Chaldea, and we shall never discover any authentic document, that reaches nearly so high as the flood. It would not be a useless nor an idle task to go back from this time, and to ascertain the phænomena in the heavens to the day of the first appearance of man on this earth. In that interval we should find the circumstances, which led the ancient astronomers to their various positions, and which gave rise to various fables: but the well-instructed mind would clearly see the fallacy of confounding the records of events in the heavens, with those which passed upon the earth: he would not give up revelation for the fancies, that occupied the minds of those, who had but just learned the rudiments of astronomy.

As we made our observations last month on the planet Venus, we might follow the same method with Mercury this month, if the weather is favourable. Being visible in the middle of the month a considerable time after Sun-set, and of course being to the east of the Sun, we

know that he is somewhere between his superior and inferior conjunction, in his way from the former, or in approaching towards the latter. In the beginning of the month we cannot discover him: but before the 17th he is high enough above the horizon to attract notice, and we observe that his distance from the Sun is increasing. Since towards the end of the month he ceases to be visible, we are sure that he is approaching towards his lower conjunction. Of course he must in this month be at his greatest elongation; and this we find is on the 17th, and then Jupiter and this planet form a conspicuous object, such as must have struck the early astronomers, but not to be compared with the effect, that the three planets, Jupiter, Mercury, and Venus must have produced, when all three were near the same point in the heavens. If this event can so seldom take place, how much seldomer must be that of all the planets being in the same spot? and, when we have formed an idea of the number of years that must elapse before any mortal will see it, what is that time to the days of eternity?

The Moon at its rising on the 1st is seen very

near to the sixteenth of the Lion, and of course under the first of this constellation. As she mounts the heavens, we shall perceive that she has passed the line between the first of the Hydra and the first of the Lion; and at nine, when she is thirty-nine degrees twenty-seven minutes from the second of the Twins, we may notice her peculiar situation in the eastern hemisphere. She is to the east of the line between the first of the Hydra, the first and third and sixth of the Lion, and the third and fourth of the Greater Bear. She has removed considerably from the sixteenth of the Lion, which star she passed at forty-seven minutes past five; and during the former part of the night we cannot fail of noticing above her the first of the Lion, which is upon the meridian nearly at the same time with her. On the 2d she rises under the first of the Lion, which star is now at a considerable distance from her, but not so far as the second of the Lion, which rises with her. As she mounts the heavens, we notice above her the stars in the Lion, and at nine she is fifty-two degrees twenty-four minutes from the second of the Twins. On the 3d she rises under the second of the Virgin, and nearly in a line with this star and the second of the Lion, as will be perceived when she mounts the heavens, but

it will be past midnight before she has crossed this line. At nine she is twenty-eight degrees forty-one minutes from the first of the Lion.

On the 4th the Moon rises under the five stars in triangle of the Virgin; and, as she mounts the heavens, the stars in the Crow are seen under her. She is evidently directing her course to the first of the Virgin, and about midnight this star with Mars will make with her a conspicuous figure in the eastern hemisphere. She is at that time forty-four degrees three minutes from the first of the Lion. On the 5th she rises under the first of the Virgin and Mars, forming with them during the night a very pleasing object. She passes the star at eighteen minutes past five in the afternoon, and is much nearer to the star than the planet, though her recess from both will be very apparent to the night traveller during the morning of the 6th. On this day she passes the ecliptic, but for evident reasons without producing an eclipse. On the 7th she rises in the morning very near to the planet Herschell, whom she passes at one o'clock; and she is followed by the first of the Balance, which star she passes at three quarters past five in the morning, when the first of the Virgin and Mars, the first of the

Balance and the Moon, the second of the Scorpion and Saturn, will form a line that will strike the traveller.

On the 8th she rises in the morning under the two first stars of the Balance, and is soon followed by the second of the Scorpion, Saturn, and Antares, forming conspicuous objects for the early riser. On the 8th she rises above, but near to the second of the Scorpion and Saturn, as she passes both star and planet in the course of the day, the star at thirty-five minutes past noon, and the planet at three quarters past four in the afternoon; and of course on the 9th, when she rises, she will be seen under them, and at no great distance, forming with them and Antares a very pleasing figure. On the 10th she is perceived at her rising to be at a considerable distance from Saturn, which will be observed to be very considerably increased on the 11th, when she is travelling through the stars in the head of the Archer, and we shall leave her till after the 14th, on which day is new Moon at fifty-nine minutes past one in the afternoon, but without an eclipse, as she is then more than four degrees and three quarters in her upright north of the ecliptick.

On the 15th, they who have a good view of the horizon at west-south-west, will in that quarter see the thin crescent of the Moon, in a line almost with Mercury and the four small stars in the Water-pot; and the Moon, Mercury, Venus, and Jupiter, thus adorning the western hemisphere, will excite much admiration, even in the least attentive observers. On the 16th the Moon is above Mercury, but near to Jupiter, and is evidently directing her course towards Venus. She is now between the lines drawn through the two eastern and two western of the four stars in Square, and at six is seventy-three degrees twenty-three minutes from Aldebaran. On the 17th her distance from Jupiter has considerably increased. She has passed the line drawn between the two eastern of the four stars in Square; and it is evident that she will pass Venus before she is seen again in the west. We still have a good opportunity of comparing together the three planets with the Moon; and they, who have telescopes, will now compare together its crescent with those of two of the planets, and explain to their neighbours, why one planet appears with a full orb. At six she is sixty degrees forty-two minutes from Aldebaran.

On the 18th the Moon is seen above but near to Venus, having passed this planet at forty-nine minutes past seven of this morning; and soon after Sun-set, as the light permits, we notice Mercury and Jupiter near each other, Venus above them, the Moon above Venus, the three stars of the Ram above the Moon, and to the south, Menkar and the small stars in the head of the Whale. At six the Moon is forty-eight degrees eighteen minutes from Aldebaran. On the 19th she is between the three stars of the Ram and Menkar, with the small stars in the head of the Whale; but she has not arrived at the line between the first of the Ram and the first of the Whale. She is now at the head of, and considerably removed from, the three planets, and we perceive how much superior her light is to theirs collectively, and may form an idea how many planets must have been created to give us an equal advantage with this companion to the Earth. At six she is thirty-six degrees eleven minutes from Aldebaran.

On the 20th, the Moon, at the first appearance of the three planets, heads them, though now at a considerable distance from Venus the highest. She is in a conspicuous situation between the

three first stars of the Ram, the Pleiades, and Menkar, with the small stars in the head of the Whale; and on this day she passed the equator early in the morning, but for evident reasons without an eclipse. This is her descending node, as she is now going to the south of the equator. Before Mercury sets, we shall admire the groupe formed by him, Jupiter, Venus, the stars in the Ram, the Whale, the Moon, the Pleiades, and Aldebaran, near the meridian. At six o'clock the Moon is sixty-seven degrees thirty-three minutes from the second of the Twins. On the 21st, she is on the meridian at twelve minutes past five; and, when she first appears, will be seen at some distance from the meridian, and near the line between the Pleiades and Menkar, or the first of the Whale, but near to the former stars. We have now two groupes on which to fix our attention; the three planets, and above them the Moon, encircled by the stars in the Ram, the head of the Whale, the Pleiades, and Aldebaran. As Mercury sinks under the horizon, Orion approaches to the meridian. At six the Moon is fifty-six degrees and at nine fifty-four degrees thirty-five minutes from the second of the Twins. On the 22d the Moon is on the meridian at six o'clock, when underneath her is Aldebaran, the first of the Bull, and

near her the fifth of this constellation, or star in the Bull's-eye, which she passed at forty-four minutes past three. When she is on the meridian, the heavens, if the weather is fine, will present a glorious appearance. In the eastern hemisphere Orion; near the meridian Sirius, the first of the Lesser Dog, the two first stars of the Twins, Capella, the first of the Lion, and the seven stars of the Great Bear. In the western hemisphere, Mercury near the horizon, Jupiter and Venus make up for the want of stars of the first magnitude; but the four stars in Square, the second and first of Andromeda, with the first of Perseus, the three stars of the Ram, with those in the head of the Whale and the Pleiades, will successively call our attention. At this time the Moon is eighty degrees eighteen minutes from the first of the Lion to the east of her, and thirty-four degrees twelve minutes from the first of the Ram to the west of her, and at nine she is seventy-eight degrees fifty minutes from the first of the Lion, and thirty-five degrees thirty-seven minutes from the first of the Ram.

On the 23d, the Moon is on the meridian at forty-eight minutes past six, when Mercury is just under and Jupiter near to the horizon be-

'Tween west and west by south. Under the Moon is the third of Orion, and of course the remainder of that constellation is near to the meridian. Directly above her, is the second of the Bull. Venus and Aldebaran now grace the western hemisphere. At six the Moon is sixty-eight degrees twenty-eight minutes from the first of the Lion and forty-five degrees forty minutes from the first of the Ram; and at nine she is sixty-six degrees fifty-nine minutes from the first of the Lion and forty-seven degrees seven minutes from the first of the Ram. On the 24th the Moon is on the meridian at thirty-six minutes past seven, being directly under the seventh and twelfth of the Twins. Venus is now the only planet with her above the horizon, but with Aldebaran and Orion gives lustre to the western hemisphere. Sirius is near to the meridian in the eastern hemisphere. Under the Moon, but to the east of her, is the third of the Twins; and farther eastward, but lower down, the first and second of the Lesser Dog: above her to the east are the two first stars of the Twins. At six she is fifty-six degrees twenty-nine minutes from the first of the Lion, and twenty-three degrees forty-minutes from Aldebaran, and at nine she is fifty-four degrees forty-nine minutes from the first of

the Lion, and twenty-five degrees ten minutes from Aldebaran.

On the 25th, the Moon is on the meridian at twenty-six minutes past eight, Venus being still sufficiently high above the horizon to the north of west. Under the Moon are the third of the Twins to the west and the first of the Lesser Dog to the east of the meridian. Above her to the east of the meridian the two first stars of the Twins. Sirius is now near to, but to the west of the meridian. At six she was forty-four degrees nineteen minutes from the first of the Lion, and thirty-five degrees fifty-one minutes from Aldebaran; and at nine she is forty-two degrees forty-seven minutes from the first of the Lion, and thirty-seven degrees twenty-four minutes from Aldebaran. On the 26th she is on the meridian at sixteen minutes past nine, Venus now being near to the horizon in west by north. Above the Moon are now the two first stars of the Twins, and below her the two first stars of the Lesser Dog, all to the west of and near to the meridian. The western hemisphere is most splendid. At six she is thirty-one degrees fifty-five minutes from the first of the Lion, and forty-eight degrees twenty-two minutes from Aldebaran, and at nine

She is thirty degrees twenty-one minutes from the first of the Lion, and forty-nine degrees fifty-seven minutes from Aldebaran.

On the 27th, the Moon is on the meridian at five minutes past ten, Venus being now under the horizon and Mars just risen to the east of east-south-east, the first of the Virgin being higher up to the south of that point. She is now near the two stars called the first of the Crab, the first of them having suffered an occultation this evening, which commenced at four minutes and a half past eight, when the star was five minutes and a half north of the Moon's center, and the star emerged at fourteen minutes and a half past nine, when it was seven minutes north of the Moon's center. The progress of the Moon is evidently to a point under the first of the Lion to the east of her. At six she is sixty-one degrees thirteen minutes and at nine sixty-two degrees fifty-three minutes from Aldebaran. On the 28th she is on the meridian at fifty-five minutes past ten, the first of the Lion being above her to the east of the meridian, and Mars and the first of the Virgin sufficiently above the horizon in the south-east by east. At six she is seventy-two degrees

twenty-five minutes and at nine seventy-six degrees five minutes from Aldebaran.

Mercury is an evening star during the whole of this month, and in the middle of the month is so long above the horizon, after Sun-set, that every person may, if the evenings are fine, become acquainted with this planet. He is at his greatest elongation from the Sun on the 17th, when he will not set for nearly an hour and three quarters after the Sun. His motion is direct till the 24th, when he is stationary, having moved through about twenty-nine degrees; and during the remainder of the month he is retrograde through two degrees and three quarters. At first, he is at a considerable distance from Jupiter, but the decrease of this distance will be very apparent every night for the former part of the month; but Mercury does not overtake Jupiter. The approach of the former to the latter star, and then its recess, will form a pleasing object of reflexion to the observer; and will easily be accounted for by those who use the pasteboard and planet beads. As Mercury does not set till three quarters of an hour after the Sun on the 1st, they who have a clear aspect between west-south-west and south-west by west,

may in fine evenings see him from the first. In the middle of the month he will be seen by all, and they, who have telescopes should not lose this opportunity of remarking the difference between superior and inferior planets, in the aspects of Mercury and Venus compared with that of Jupiter. Till the time of Galileo, all men almost were agreed, that these planets shone with a full orb: the discovery of the telescope has shown the mistake; and future inventions will probably shew equal errour in many sagacious remarks of the wise men of this generation. This will teach us not to be angry with our neighbours, who do not see with our eyes; much less to treat them as Galileo was treated by his, who put him into the ecclesiastical court for speaking the truth. The Moon passes Mercury on the morning of the 16th.

Venus is an evening star during this month, and has a direct motion through nearly thirty-three degrees; being on the 1st of the month in an obscure situation to the west of the line drawn through the two eastern of the four stars in Square: on the 7th she is nearly in a line with them, and is proceeding to the small stars

in the band of the Fishes. On the 18th she passes the fifth of this constellation, the star being only twenty-two minutes north of her, of course she was under the fourth a few days before, and will pass above the sixth two days after this time. She ends her course under the three first stars of the Ram, but has not reached the line drawn between the second and third and produced. Her distance from Jupiter, from whom she was distant only five degrees and a quarter on the 1st, is continually increasing, and as she is high above the horizon for a considerable time after Sun-set we shall have every opportunity of making observations on her orb and motion. The Moon passes her on the 18th.

Mars is visible in the night during this month, rising on the first about eleven at night, and on the 25th about ten minutes before ten. His motion is direct through nearly four degrees and a half. On the 1st he rises nearly at the same time with the first of the Virgin, from which star he is distant about five degrees, and daily receding from it he moves towards the tenth of the Virgin. The Moon passes him on the 5th.

Jupiter is an evening star, and on the 1st is about five degrees and a half from Venus. His motion is direct through about six degrees and a half; and as he moves so slowly, and Venus advances so rapidly, the distance between them will appear every night to be rapidly increasing. As Venus however retreats from him, Mercury approaches to him. As he is so long above the horizon after Sun-set, and many telescopes will be directed towards him, from the unusual circumstance of those three apparently largest planets being so near to each other, and visible at the same time, the observer will notice peculiarly the eclipses of his moons, of which there will be one at six o'clock on the 9th, the 16th, and the 17th. During the whole month he continues in the space between the line drawn through the two eastern, and the line drawn through the two western of the four stars in Square. The Moon passes him on the 16th.

Saturn is a morning star, being on the meridian on the 1st at five minutes past seven, and on the 25th at half past five. His motion is direct, through nearly a degree and a quarter, being in a conspicuous situation to the east of the

second of the Scorpion, and with that star and the first or Antares forming a pleasing object to the early traveller. The Moon passes him on the 8th.

Herschell rises before midnight on the 1st, and is on the meridian at half past five in the morning, and on the 20th is on the meridian at nine minutes past four in the morning. On the 13th he is stationary, so that his motion this month is scarcely perceptible. The first of the Balance is a sufficient direction to him, from which star he is distant about two degrees and a half, being to the west of it. The Moon passes him at one in the morning of the 7th, being then very near to him.

The apparent diameter of the Sun is on the 1st thirty-two minutes and a half, and on the 25th thirty-two minutes twenty-one seconds. The Moon's apparent diameter first increases, then decreases, and lastly increases. On the 1st it is thirty-one minutes seventeen seconds; and it increases to the 9th, when it is thirty-two minutes twenty-two seconds: it now decreases to the 21st, when it is twenty-nine minutes thirty-eight seconds, and then increases

to the end of the month, being on the last midnight thirty-one minutes and a half.

TABLE OF POSITIONS.

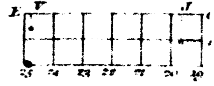
Pos.	1		8		15		22	
	h.	m.	h.	m.	h.	m.	h.	m.
XI.	4	32	4	4				
XII.	6	38	6	10	5	42	5	15
I.	8	28	8	0	7	32	7	5
II.	10	31	10	3	9	35	9	8
III.	0	20	11	52	11	24	10	57
IV.	2	41	2	13	1	45	1	18
V.	4	32	4	4	3	36	3	9
VI.	6	28	6	0	5	32	5	5

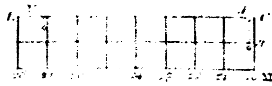
*** See volume for 1808, page 53, for remarks under the table of positions for that year.

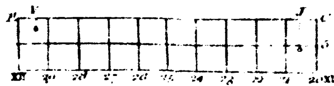
MARCH, 1809.

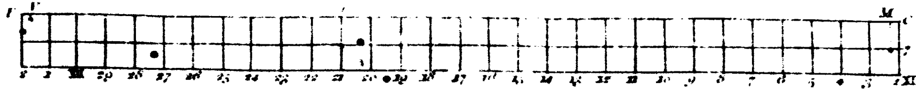
IN the last month, probably many of my readers had the opportunity of comparing together our three brightest planets, and several would view them through a telescope, and remark the different appearances of the two inferior from that of the superior planet, as also the variation of their aspects compared with each other. The brightness of a planet, we have observed, depends partly upon its distance from us, and partly upon the quantity of its orb, that is illumined. At least this is the general way of considering the question, and will be sufficient for the answering of it, when we are only comparing the brightness of the same planet at different times in its orbit.

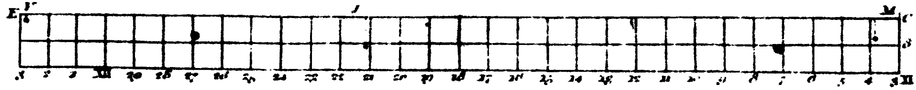
Thus, when it is asked, at what times Venus is the brightest, the answer is readily given, as it is discovered by a very elegant mathematical problem, that she is brightest at a point, between her inferior conjunction and her greatest

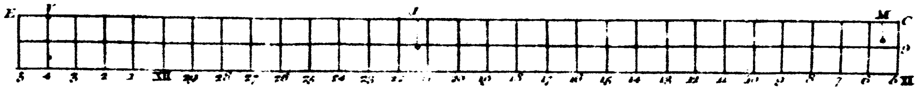












elongation. Of course, according to this solution, there are two places in her orbit, where her brightness is the same, and greater than in any other places of her orbit. These two places are the one between her inferior conjunction and greatest elongation on the eastern; the other, between her inferior conjunction and greatest elongation on the western side of her orbit.

This solution goes on the presumption, that the orbit of Venus is very nearly circular; and it sufficiently answers for general purposes, as it gives the places near the greatest elongations, though the precise points are far from being accurately determined. Upon the same plan, the places where Mercury appears to be the brighest are ascertained to be between his greatest elongations and his superior conjunction. Mercury last month was between his superior conjunction and greatest elongation, and therefore according to this supposition attained his greatest degree of brightness: but Venus being also between her superior conjunction and greatest elongation, did not during that time attain her greatest degree of brightness. But Venus during this month passes her

greatest elongation, and moves towards her inferior conjunction. We may then observe how much her brightness is superior this month to what it was last.

How differently are often actual observations from the dry result of mathematical calculations! and with what triumph does the vulgar mind exult, when it thinks, that the labours of the enlightened tend to no useful purpose! The vulgar measure of utility is bounded by its own confined views; and if the science of the philosopher determines accurately one point which in practice is not found to take place, the fault is not in the philosopher but in the practitioner. The philosopher determines what will be the result of certain actions upon certain principles; but if you vary the least in the world your actions or your principles, the very accuracy of the philosopher will prevent his success in practice. Thus a philosopher tells you what is the exact line a body would describe, supposing it to be acted upon by a force like that we call gravity, and thrown with a certain degree of velocity at a certain angle; but if the engineer places a cannon before the philosopher, and desires him

to hit a mark, it is a hundred to one that the philosopher is beat by the commonest artillery-man. I may settle, as I please, the motions of elastic balls, and no one will doubt the truth of my theory; yet if I attempt to bring my rules into action upon a billiard table, any ensign in the Guards will soon teach me the difference between theory and practice.

Happy it is for mankind that this is the case; and both parties might derive useful instruction from it. The philosopher, in applying his cases to real life, would learn to consider what circumstances may take place to destroy his positions; and the practitioner, who by long experience has discovered a useful truth, may carry it forward to far more extensive purposes, by the assistance which he would derive from philosophy. The philosopher has determined the times for the greatest brightness of Venus and Mercury; but in his solutions he considers only the Sun as the enlightening body, the planet as an opaque body reflecting the rays of the Sun, and the eye of an observer upon the Earth receiving the reflected rays, and noticing the different degrees of brightness, which they impart. The eye is also supposed

to be in the center of the Earth, with nothing to intervene between him and the planet. The problem was certainly an ingenious one to find in such a case when a planet would appear to be the brighest; but in the application of it to real life, some other things are to be considered, and our problem becomes more intricate.

It is obvious that, if we, according to rule, determine the evening or morning when Venus is to shine the brighest, our climate will very often destroy the prediction. A misty air will make a much greater change in her appearance than will follow from any variation that takes place in her distance, near to the position we have fixed upon for this greatest brightness. But it will be said, it is obvious, also, that the philosopher could never take into consideration so variable a thing as the weather, that may prevent any observations; and we must take for granted, in these things, that the weather is favourable to us. If we allow thus much, still I fear the philosopher will not be a great gainer; for some fixed causes come in, which he has not taken into account. For if the planet is to appear the brightest, it must

appear so to some person existing upon the Earth; and we cannot destroy the Moon, or the diurnal motion of the Earth, for the sake of his ingenious problem.

The fact is, that the day fixed for the brightness of the planet being the greatest, may be the very day, when the Moon is at full; and though she cannot in such a case be near to the planet, yet her superior splendour must very much impair the planet's light, which will in future evenings increase instead of decrease in brightness. But it is not necessary for the Moon to be at its full: for if it has just finished its third, or is entering upon its last quarter, on the day fixed for the greatest brightness, that brightness will assuredly not be so great, as it would be, were the Moon near to the Sun, and the planet far removed from its point of greatest brightness.

Again, what a difference is there not between the light of a summer's and of a winter's evening, owing to the different positions of the Sun at the same time after Sun-set. How different then must the brightness of Venus be in summer on the day fixed for its greatest brightness,

from what she possesses in winter a long time before and after her greatest elongation. On a dark clear wintry night, when the Moon gives no light to the Earth, and the twilight has ceased, Venus will appear with far superior splendour at any height above the horizon, than she can in summer upon the day fixed for her greatest brightness.

We have thus pointed out some reasons for not accepting the philosopher's solution of the celebrated problem, respecting the greatest brightness of an inferior planet; and these arise from considerations, some of them that might have fallen under his contemplation. They are of weight when we consider only one planet: how far his problem will assist us, in comparing together the splendour of two different planets, when each according to him has arrived at its greatest brightness, may be the subject of farther enquiry. The Moon's splendour will now occupy our attention.

On the 1st the Moon is on the meridian at three quarters past eleven, being under the middle of the Lion; the first being above her to the west, and the second above her to the

east of the meridian, but at a much greater distance. At this time Mars and the first of the Virgin are in the south-east; and soon after her rising, two planets in the west, the Moon in the east, and Orion near the meridian, form a very glorious scene. At nine o'clock she is forty-seven degrees forty-nine minutes from the second of the Twins. On the 2d is full Moon, at fifty-seven minutes past three in the morning, but without an eclipse, as she is about three degrees and a half in her upright from the ecliptick. She rises under the Lion, almost in a line with the fourth and eighth of this constellation; and is soon followed by the second of the Virgin: before she sets she passes the line drawn through the second of the Lion and the second of the Virgin, passing under the latter star. At nine she is sixty-one degrees seventeen minutes from the second of the Twins. On the 3d she is seen at her rising near the five stars in triangle of the Virgin, but nearest to the seventh of this constellation. As she mounts the heavens, the first of the Virgin and Mars to the east, and the first and second of the Lion to the west of her, call our attention. At nine she is thirty-eight degrees nine minutes from the first of the Lion.

On the 4th, the Moon is followed soon after her rising by the first of the Virgin; and it is evident by the progress of the Moon that she will pass near to this star, which in fact suffers an occultation. This takes place at twenty minutes past ten, when the star disappears, being then fifteen minutes south of the Moon's center; and it appears again at three quarters past ten, when it is fourteen minutes and three quarters south of the Moon's center. As a star of the first magnitude thus disappears, it is to be hoped that the night will be favourable for observations upon it. Still the great splendour of the Moon is a disadvantage. At nine o'clock she is fifty-two degrees nineteen minutes from the first of the Lion. The position of the Moon afterwards between this star and Mars, will give an interest to her motion during the whole night. On the 5th she rises under the first of the Virgin and Mars, having passed the planet in the morning; and on this day she passes the ecliptick, going from the southern to the northern side, but for evident reasons without producing an eclipse. During the night, the first of the Virgin, Mars, the Moon followed by the two first of the Balance, and the two first of the Scorpion,

will present a pleasing scene to the traveller. On the 6th she rises under Herschell and the first of the Balance, having passed the planet at half past six in the morning, and the star at half past eleven: her progress is towards the second of the Scorpion and Saturn. The star she passes at six in the evening of the 7th, and the planet at thirty-six minutes past eleven at night; so that when she rises in the morning of the 8th, she is seen under these two objects, and with him and Antares forms a very agreeable object to the traveller.

On the 9th, the Moon rises in the morning at a considerable distance from Saturn and Antares, and is followed by the small stars in the head of the Archer. On the 10th she is followed soon after her rising by the small stars in the head of the Archer; and on the 11th she is seen soon after her rising to be between these stars and the two first of the Goat, evidently directing her course to these latter stars. On the 12th she is seen rising under the two first stars of the Goat, having passed the second or lowest of these stars at forty minutes past two in the morning. On the 13th, she rises between the two first stars of the Goat and the second of the Water-bearer; where we leave

her, as the new Moon is on the 16th, at nineteen minutes past four in the morning, but without an eclipse, as she is upwards of three degrees in her upright north of the ecliptick, or Sun's apparent path in the heavens.

On the 18th, we may resume our observations on the Moon in the west, but in vain look for the companions of its similar appearance last month (Mercury and Jupiter), as when she appears they are both under the horizon, Mercury preceding and Jupiter following the Sun, and setting very soon after him. At the first appearance of the Moon on this day, we see her under the three first stars of the Ram, Venus now being near to her; and these stars, the Moon, and the planet, will form a very pleasing object in the west. On the 19th she passes the ecliptick, or Sun's apparent path, in the morning, being at her descending node, but for evident reasons without producing an eclipse. At the first appearance of these stars, we notice her between the three first of the Ram and Menkar, or chief star in the head of the Whale, having just passed the line between the first of the Ram and the first of the Whale. She is directing her course towards Aldebaran; and this star, with the Pleiades and

Venus with the three stars of the Ram, will strike all, who look at the Moon this evening. At nine she is twenty-six degrees forty-eight minutes from Aldebaran. On the 20th she is seen under the Pleiades, and nearly in a line with these stars and Menkar, but much nearer to them than to the latter star. Venus and the three first stars of the Ram are now at a considerable distance from her. At nine she is fifty-eight degrees twenty-nine minutes from the second of the Twins. On the 21st, she passes through the Hyades, being at thirty-five minutes past eight nearest to the first fourth of the Bull, at six minutes past nine nearest to the second fourth, and at forty-nine minutes past eleven nearest to the fifth, or Bull's-eye. In this progress Aldebaran cannot fail of exciting our attention, being in a line between her and the third of Orion. At nine she is forty-seven degrees two minutes from the second of the Twins.

On the 22d, the Moon is seen above Aldebaran, being above the line between this star and the sixth of the Bull or tip of the southern horn, the latter star being nearest to her. Of course we see above her the second of the Bull,

or tip of the northern horn: and in this position she heads a group worthy of notice; as it contains the Pleiades and Hyades, the three stars of the Ram, and Menkar with the small stars in the head of the Whale; and lastly, but not least in splendour, Venus. Orion under her towards the south, and Capella at a distance above her towards the north, unite their glories in adding lustre to the scene. At nine she is seventy-one degrees two minutes from the first of the Lion. On the 23d, she is seen nearly in the line between the sixth of the Bull and the third of the Twins, but nearest to the former star. Above her are the seventh and twelfth of the Twins, and at a greater distance the two first of this constellation, under her is Orion. At nine she is fifty-nine degrees twelve minutes from the first of the Lion.

On the 24th the Moon is on the meridian at twenty-four minutes past six, having then under her, but to the west, the third of the Twins, and above her to the east the two first of this constellation. Of course, when the evening is sufficiently advanced, we shall see below her the third of the Twins, and the first of Orion, as she is visible nearly in a line with these stars and the se-

cond of the Twins. At nine she is forty-seven degrees fifteen minutes from the first of the Lion. On the 25th she is on the meridian at twelve minutes past seven, having then above her the two first of the Twins, and below her the two first of the Lesser Dog, and being almost in a right line with the second of the Twins and the first of the Lesser Dog; all being at this time on the meridian. The western hemisphere is now splendid; the line from the Moon to Venus pointing out objects familiar from former notice; whilst, under this line, Orion and Sirius make the region between the south and south-west conspicuous. At nine she is thirty-five degrees and six minutes from the first of the Lion.

On the 26th the Moon is on the meridian at one minute past eight, being in the barren region of the Crab, and having above her to the east of the meridian the Nebula, with the northern and southern Asses, and to the west the two first stars of the Twins: considerably to the east of her is the first of the Lion; and Mars, with the first of the Virgin, are just risen in the east-south-east. Venus is set; but the western hemisphere has great brilliancy, from the south-south-west to the west. At nine she is fifty-seven de-

grees forty-two minutes from Aldebaran, and seventy-five degrees fifty-eight minutes from the first of the Virgin. On the 27th the Moon is on the meridian at fifty minutes past eight, having directly under her almost the first of the Hydra. The two first stars of the Crab are now to the west of her, as she passed the first at fifty-seven minutes past six this morning, and the second first at fifty-seven minutes past seven. The first of the Lion is at some distance from her to the east, the stars in the head not having quite reached the meridian. Mars and the first of the Virgin are now at some height above the horizon towards east-south-east. At nine the Moon is seventy degrees thirty-seven minutes from Aldebaran, and sixty-three degrees two minutes from the first of the Virgin.

On the 28th the Moon is on the meridian at forty minutes past nine, having the first of the Lion above her, but to the west of the meridian; and she is evidently directing her course towards the first of the Virgin, from which star she was distant forty-nine degrees forty minutes at nine o'clock, and at the same time distant forty-two degrees twenty-one minutes from the second of the Twins. On the 29th she is on the meridian

at thirty-one minutes past ten, having the small stars of the Cup under her; and to the west of the meridian and above her the eighth and fourth of the Lion, the second being to the east of and above her. The first of the Lion is of course to the west of her, and the first of the Virgin and Mars midway between her and the point south-east by east. At nine she is thirty-five degrees fifty-four minutes from the first of the Virgin, and fifty-five degrees thirty-seven minutes from the second of the Twins. On the 30th she is on the meridian at twenty-three minutes past eleven, having above her to the east the seventh, and to the west the second of the Virgin, being two of the five stars in triangle. The whole of the Lion is now to the west of the meridian, the second being considerably above her. Under her are the stars in the Crow; and the first of the Virgin and Mars, the two first stars of the Balance, and Saturn, just risen with the second of the Scorpion, adorn the line from her to the point south-east by east. At nine she is thirty-two degrees twenty-six minutes from the first of the Lion. On the 31st is full Moon at twenty-three minutes past three in the afternoon, but without an eclipse, as the Moon is upwards of two degrees in her upright south of the eclliptick,

or Sun's apparent path. Soon after her rising she is followed by the first of the Virgin and Mars, Venus declining towards the west north-west. During the night her approach to the first of the Virgin will attract the notice of the traveller; and the Moon, the star, and Mars, will form a very pleasing object. Soon after midnight, when she is on the meridian, the line between her and the point south-east by east points out the first of the Virgin and Mars, the two stars of the Balance, Saturn, the second of the Scorpion, and Antares. As she approaches the western horizon, Mercury announces day in the east. At nine she is forty-six degrees forty-seven minutes from the first of the Lion.

Mercury is at his inferior conjunction on the 5th at six in the morning, and of course so near the Sun during the early part of the month, that he will not be visible. From the 5th he is a morning star, travelling on very rapidly with a retrograde motion till the 18th, when he is stationary, and from that time he is progressive to the end of the month. Though at a considerable distance from the Sun on the 18th, being then nearly distant twenty-one degrees, yet at Sun-rising he will be only between five and six degrees

above the horizon, and of course will be noticed only by the keen observer. The Moon passes him on the night of the 14th.

Venus is an evening star, being at its greatest elongation on the 13th. Her motion is direct through about thirty degrees, commencing at a point under the three stars in the Ram, when she is in a line with the second and third, and ending at a point near to and just under the Pleiades. On the 12th she is in the line between the first of the Ram and the first of the Whale, but much nearer to the former star. On the 20th she passes the fifth of the Ram; and on the 25th she is above and nearly in a line with the sixth and the fourth of this constellation. The Moon passes her on the 20th.

Mars rises on the 1st a little before ten at night, and on the 25th at three quarters past seven; of course this month is favourable to observations upon him, and they, who have telescopes, will notice, whether his orb is round or not, and give reasons why he does not always shine with a full orb. He is stationary on the 1st, being then above the line between the first and tenth of the Virgin, but nearest to the latter

star. From this day his motion is retrograde through five degrees and three quarters, approaching towards the first of the Virgin, but moving in a line, which will not pass within four degrees of her. His motion by this star will excite attention. The Moon passes by him on the 5th.

Jupiter is in conjunction with the Sun on the 22d, at one in the morning, and of course will be an evening star near to the horizon in the earlier part of the month. His motion is direct through seven degrees and a half, ending at a point in a line with the two eastern of the four stars in Square. The Moon passes him on the 16th.

Saturn is on the meridian at twenty minutes past five in the morning of the 1st, and fifty minutes past three on the morning of the 26th. On the 13th he is stationary, and of course his motion very slow, first from, then back again, towards the second of the Scorpion. The groupe therefore of this planet and Antares, and the second with the smaller stars of the Scorpion, will form a pleasing object during the whole month. The Moon passes him on the 7th.

Herschell has a small retrograde motion during this month of nearly fifty minutes, almost in the line between the first of the Balance and the eleventh of the Virgin, being at first about two degrees and a half from the former star. The Moon passes him on the 6th, at thirty-one minutes past six in the morning, being then very near to him.

The Sun's apparent diameter on the 1st is thirty-two minutes nineteen seconds, and on the 25th is thirty-two minutes six seconds. The Moon's apparent diameter first increases, then decreases, and lastly increases. On the 1st it is thirty-one minutes forty seconds; from which time it increases to the 5th, when it is thirty-two minutes thirty-four seconds; it decreases to twenty-nine minutes thirty-six seconds, at which extent it is during the 21st; it then increases, and ends with an extent of thirty-two minutes fifty seconds.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
I.	6	38	6	12	5	43		
II.	8	41	8	15	7	46	7	17
III.	10	30	10	4	9	35	9	6
IV.	0	51	0	25	11	56	11	27
V.	2	42	2	16	1	47	1	18
VI.	4	38	4	12	3	43	3	14
VII.	6	38	6	12	5	43	5	14

*** For the description of the above positions, see the volume for 1806.

APRIL, 1809.

IN the observations we made on the greatest brightness of Venus last month, the whole difficulty of fixing the time, when it would take place, was pointed out; and if one planet alone might exercise the talents of the greatest mathematicians, what will be the case, if we should wish to compare together the brilliancy of two planets for every night or morning of their appearance. Mercury, Venus, and Jupiter shine with very different degrees of lustre. The original cause of their shining at all is in the Sun, from which rays of light are continually emitted, to travel into the boundless regions of space. The surprising velocity with which each particle of light proceeds, is ascertained; and if an opaque body is in its way, it must either be absorbed by it, or reflected; and if the reflected ray strikes the eye of an observer, when it is not overpowered by other rays from the Sun, he will see the planet in the heavens.

Since Mercury is much nearer to the Sun than Venus, a much greater number of rays will fall upon a portion of his surface, than upon an equal portion of the orb of Venus; but whether a greater number will be reflected, is a point not easily to be determined. Supposing that the two planets were of the same kind of substance, that is both gold or silver, or the same composition of similar substances, then it is evident, that the more distant planet receiving fewer rays on the same portion of surface than the nearer planet, must also reflect fewer. But it might have been so originally constituted, that the two planets, differing completely in the nature of their substances, should vary materially in the powers of reflecting light: so that the planet, nearer to the Sun, should absorb a very great proportion, and reflect very few rays; whilst the more distant planet should absorb very few, and reflect a very great proportion of the rays falling upon its surface.

How is this case with respect to Mercury and Venus? We see these planets frequently; but who can give a competent answer to this question? The fact is, that we are perfectly ignorant as to the nature of these two planets; and with

the utmost stretch of our imagination we cannot form an idea, to use a common phrase, what they are made of. It seems probable that they differ very much from the Earth, which we inhabit; but even on this point we must not be too positive; nor, though Sir Isaac Newton has talked of comets being some millions of times hotter than red hot iron, are we to imagine, that it is impossible for this Earth to make an approach nearer to the Sun than any comet has done, without being consumed by its rays.* It is certain that, if heat increased or decreased in proportion to the approach or recess of an object from the Sun, then we might ascertain a point, beyond which the Earth could not approach without complete destruction; but, for aught we know, the rays of the Sun may, in the vast spaces of our system, unoccupied by either planet or comet, be entirely incapable of communicating heat; and the quality of heat depends we know, upon Earth, on the nature of the body receiving the rays of the Sun, as well as on the number of rays, which fall upon it.

The Andes in South America are covered with eternal snow, in places where the Sun is vertical over their heads; and in the vallies, a few miles

below, the inhabitants at the same time are complaining of his fiery darts. At that moment it is certain, that the top of the Andes is nearer to the Sun, than the bottom of the valley; and at any rate that, as far as the Sun is concerned, his rays must have a more powerful effect on a surface of thirty or forty miles in extent, on the top of the Andes, than it can possibly have upon an equal surface in England; and during the whole year his rays are constantly exerting a greater force on the top of the Andes than on England. Yet, whilst the former are covered with perpetual snow, England is delighting in the vicissitudes of the seasons, and but for a small time loses its verdant appearance. We must then look for other causes of heat than in the rays of the Sun; and who knows, that Mercury is not a cool, instead of a hot planet?

I ought to correct myself. To speak of Mercury being either hot or cold may be an absurdity. It may be neither; for, if we were on a sudden transported into that planet, immediate dissolution might ensue, and it might be impossible for beings like ourselves to have a sensation in that planet. This dissolution might take place, however, from various causes; it might be either

from excessive heat, or excessive cold, or from some powerful quality of the Mercurial planet, of which it is impossible to give an idea to beings constituted like ourselves. We have certain senses, from which we derive our ideas from objects around us; but the great Creater is not confined in his modes of operation. The diversity that takes place in the works with which we are acquainted, affords us sufficient reason to believe, that a similar diversity prevails in other parts of the creation; and that in other planets may exist beings, endued with a variety of powers, not one of them like ourselves, and yet all contributing to the happiness of the individual, and enabling him to pay the just tribute of duty and love to our Universal Parent.

It is useful for us, in contemplation of the great works of the Author of our being, to reflect on them with that degree of humility, which becomes creatures in our station in the universe. Where we cannot speak decisively, we may surely be contented with the numberless objects within our reach; and if we wander forth into a wide field of speculation, which I by no means condemn, let it be done with the constant sentiment of our own imperfections, and the bound-

less wisdom and power of God. Persons have been found so absurd, as to decide with an authoritative tone, that the Moon and planets cannot be inhabited, because they have no atmosphere, or they are too near, or too far, from the Sun. They forget, that breathing, which is essential to our existence, may not be at all necessary to another being; they do not consider, that hot and cold are merely relative terms; and that the sensation of either may be unknown to some beings, who possess qualities which we are equally incapable of feeling.

In one point the inhabitants of all the planets and all the systems probably agree, that is, in the sensation of pleasure and comfort, derived from the objects around them. In qualities which we call rational, there may be that agreement, that in all the worlds the rational inhabitants, in different degrees, are capable of adoring their Maker, and loving their fellow-creatures. In the last faculty, we would fondly hope that they are far superior to ourselves; for, though love is the essential principle of the religion professed in this kingdom, too many melancholy proofs are given, that it is little thought of in practice; and though our Saviour inculcated this point more

than any other, his disciples have been more eager to form themselves into little knots, separated from each other by the idle traditions of men, than to prove their relationship to our common Lord, by the same love to each other which he has exhibited towards us all. The whole world will, however, in due time, worship the everlasting Father; and, joined in a common bond of love, with our Saviour at their head, will all unite in celebrating the praises of his God and our God *. The subject is carrying me too far, for I thought of proposing a problem only to my readers. I must defer it to the next month, and now proceed to our usual occupations.

On the 1st the Moon rises under Mars and the first of the Virgin, being soon after followed by the tenth and eleventh of this constellation, and during the night is observed to approach towards the eleventh. As she mounts the heavens, Mars and the first of the Virgin to the west, and the Scorpion with Saturn in the east just risen, make the line from the meridian to south-east by south

* Read the seventeenth verse of the twentieth chapter of John's Gospel.

conspicuous. At nine she is sixty-one degrees twenty-four minutes from the first of the Lion. On the 2d she rises under the eleventh of the Virgin and Herschell, having passed the star at eighteen minutes past six in the morning, and the planet at twenty-six minutes past one in the afternoon; but the star the most conspicuous nearest to her is the first of the Balance, which she passes at thirty-two minutes past seven in the evening. On this day she passes the eclıptick, or Sun's apparent path, in the morning, but without producing an eclipse, for evident reasons. As she mounts the heavens, her position near the first and under the second of the Balance, the first of the Virgin and Mars on one side, and Saturn and Antares on the other side, must necessarily attract notice. On the 3d she is followed soon after her rising by the second of the Scorpion and Saturn, and afterwards Antares. She passes the second and Saturn in the morning of the 4th, the star at four minutes past one, the planet at fifty-four minutes past five. In her way from the star to the planet, she passes over the thirteenth of the Scorpion. The occultation begins at thirty-four minutes past two, when the star is three minutes and a half north of the Moon's center, and ends at forty-six minutes and a quarter past three, when

the star emerges at the distance of two minutes and a half north of the Moon's center. She rises again just before midnight, nearly at the same time with Antares; and during the morning of the 5th makes, with this star and Saturn, a groupe to attract attention. About three in the morning, when the Scorpion is on the meridian, and Saturn upon it, the Moon on one side, and the stars of the Balance, with Mars and the first of the Virgin on the other, decorate highly the southern part of the heavens.

On the 6th she rises in the morning at a considerable distance from the Scorpion and Saturn; and, as she mounts the heavens, is perceived to be directing her course to the two first stars of the Goat. On the 7th she rises nearly at the same time with the small stars in the head of the Archer, and is followed soon after by the two first stars of the Goat. On the 8th she rises just before the two stars of the Goat, preceding them as long as she is visible; but she passes the second at twelve minutes past eight in the morning: of course on the 9th she rises at some distance to the east of them; and, as she mounts the heavens, is perceived to be about mean way between these stars and the second of the Water-

bearer. On the 10th she rises under the second and first of the Water-bearer; and, as she mounts the heavens, Mercury to the east of her will excite our attention. On the 11th she rises under the four small stars in triangle in the Water-pot. On the 12th she rises in the space between the two lines drawn, the one through the two western, the other through the two eastern of the four stars in Square, being soon followed by Mercury, whom she passes this day; and on the 14th is new Moon, at fifty-seven minutes past seven after noon, producing an eclipse of the Sun, but without effect to the inhabitants of this island.

On the 16th the Moon is seen again in the west, and under the Pleiades; Venus, with Aldebaran, forming a beautiful object above her. On the 17th she is seen at her first appearance between the Pleiades and Aldebaran, not having passed the line between the cluster and this star. Above her is Venus at some distance; but the line now between the Pleiades and the first of Orion, having Venus on one side, the Moon, Aldebaran, and the second of Orion on the other, will claim our attention. At nine she is fifty degrees thirty-two minutes from the second of the Twins. On the 18th we perceive a consider-

able change in the groupe of last night; the Moon is now above Aldebaran, and nearly in a line with Venus and the first of Orion. The fifth of the Bull, or Bull's-Eye, she passed at ten minutes past seven this morning. At nine she is seventy-four degrees thirty-eight minutes from the first of the Lion.

On the 19th the Moon is seen to have passed the sixth of the Bull, or tip of his southern horn, and has above her at some distance the seventh and twelfth of the Twins: in this situation she is encircled by a fine groupe, consisting of Aldebaran, with the Hyades, the Pleiades, Venus, Capella with his companion, the two first stars of the Twins, and the two first of the Lesser Dog. The Lion is upon the meridian, and Mars, with the first of the Virgin, decorate the eastern hemisphere in the south-east: at this time Sirius, or the first of the Great Dog, is near the horizon in south-west by west. At nine o'clock she is sixty-two degrees fifty-two minutes from the first of the Lion. On the 20th she is advanced beyond the seventh and twelfth of the Twins; and under, but near to her, is the third of the Twins; she is now at a considerable distance from Venus, and her position within the splendid groupe

around her is considerably changed from what it was last evening. At nine o'clock she is fifty-one degrees four minutes from the first of the Lion.

On the 21st, the Moon is at the limits of the splendid groupe that was around her last night; and above her at a considerable distance are the two first stars of the Twins, and below but much nearer to her the two first stars of the Lesser Dog. At nine o'clock she is thirty-nine degrees ten minutes from the first of the Lion. On the 22d, she is perceived to have passed the line between the two first stars of the Twins, and the two first stars of the Lesser Dog, reaching to her greatest distance in her upright from the ecliptick or Earth's path southward; and she thence slowly approaches again towards it, directing her course to the two stars called first and second first of the Crab. At nine, she is twenty-seven degrees eight minutes from the first of the Lion.

On the 23d, the Moon is on the meridian at forty-eight minutes past six; and when the stars appear, she will be seen above the two first stars of the Crab; having passed the first

first at forty-seven minutes past three, and the second first at forty-eight minutes past four in the afternoon: below her are the small stars in the head of the Hydra, and above her we shall notice the first of the Lion, and the stars in the Lion's head: at nine o'clock she is sixty-seven degrees fifty-four minutes from the first of the Virgin; and in remarking that distance, we cannot fail of noticing Mars, who is nearest to her. On the 24th, she is in the meridian at thirty-six minutes past seven, having above her the first of the Lion and below her at some distance the first of the Hydra: in this position the stars in the Lion, with Mars and the first of the Virgin, will excite our attention in the eastern hemisphere: but the western hemisphere, towards west by south, will be far more brilliant, and Venus will shine with considerable lustre: at nine o'clock she is fifty-five degrees one minute from the first of the Virgin.

On the 25th, the Moon is on the meridian at twenty-five minutes past eight, being under the body of the Lion; the first being to the west and the second to the east of the meridian. Mars and the first of the Virgin will call our attention to the east of her; and in the west,

Venus, Aldebaran, and the first of Orion, will decorate the lower part of the lower region. At nine she is forty-nine degrees fifty-nine minutes from the second of the Twins, and forty-one degrees forty-three minutes from the first of the Virgin. On the 26th she is on the meridian at a quarter past nine, having directly above her the second of the Virgin and the second of the Lion. Saturn is now rising near south-east by east, and Venus is near the horizon; in the north-west they will of course soon be nearly at the same height above the horizon; and the difference in their lustre will be strikingly different. Saturn however is more affected by the splendour of the Moon than Venus; and Mars still more than either of them. For some little time we have three planets above the horizon to excite our attention. At nine the Moon is sixty-three degrees nineteen minutes from the second of the Twins, and twenty-seven degrees fifty-eight minutes from the first of the Virgin.

On the 27th, the Moon is on the meridian at seven minutes past ten, being directly under the five stars in triangle of the Virgin, the seventh being on the west and the third to the

east of the meridian. Mars forms now, with the first of the Virgin, a conspicuous feature to the east of her. Saturn and Venus are both near the horizon, the former to the east of south-east, the latter to the west of north-west. At nine the Moon is forty degrees nineteen minutes from the first of the Lion. On the 28th she is on the meridian at one minute past eleven, having to the west of her both the first of the Virgin and Mars; and she passed near to the star at thirty-seven minutes past seven. During the evening therefore the planet, star, and Moon, will form a pleasing groupe. At nine she is fifty-four degrees fifty-one minutes from the first of the Lion.

On the 29th, she is on the meridian at one minute before midnight, and at forty-two minutes after is full Moon; and during this time she suffers an eclipse. The eclipse begins at five minutes and a half past eleven, and continues till five minutes and a half past two in the morning. The digits eclipsed are ten degrees twenty-nine minutes on the Moon's southern limb. She is in her ascending node, being at noon ten minutes eight seconds in her upright south of the ecliptick, or Earth's path;

and at midnight thirty-one minutes twenty-eight seconds north of the ecliptick, or Earth's path. Of course we can tell her distance from the Earth's path at full Moon. At noon her apparent semi-diameter was sixteen minutes thirty-seven seconds, and at midnight sixteen minutes and forty seconds; and at noon of the 30th it is sixteen minutes forty-two seconds. The Sun's apparent semi-diameter during the time of the eclipse is fifteen minutes fifty-four seconds and a half. Her longitude at noon of the 28th is VI. 16° 30′ 42″, and at midnight VI. 23° 52′ 27″. At noon of the 29th, VII. 1° 18′ 31″. The Sun's longitude on the noon of the 28th is I. 7° 44″ 43″, and at noon of the 29th is I. 8° 42′ 55″. At nine the Moon is sixty-nine degrees forty-four minutes from the first of the Lion. During the night, we remark to the west of her Mars and the first of the first of the Virgin, and much nearer to her the two first stars of the Balance. On the 30th she rises under the two first stars of the Balance, and is followed soon after by Saturn with the two first stars of the Scorpion. At a considerable distance to the west of her are Mars with the first of the Virgin; and during the night these objects will fix our attention. At nine

she is thirty-one degrees one minute from the first of the Virgin.

Mercury is a morning star during the whole of this month, being at his greatest elongation on the first; but even on this day the Sun rises so soon after him, that he will be seen by but few people; and on each successive day the opportunity of seeing him diminishes. The Moon passes him on the 12th.

Venus is an evening star, and during the whole month shines soon after Sun-set with great lustre in the west. Her motion is direct through about fifteen degrees. On the 1st she is seen very near to the Pleiades, and her passage through them will excite attention. She passes the sixth on the 2d, this star being twenty-one minutes to the south of her. Her passage is now through a desolate region, towards the second of the Bull or tip of the northern horn; but she will receive a check by the time she gets half way between this star and the Pleiades. But we shall now have an opportunity of comparing her splendour with that of Aldebaran, the first of Orion, and Sirius. In her course after her passage

through the Pleiades, she will be in a right line nearly with Aldebaran, the third of Orion, and Sirius. As Mars is on the other side of the meridian, his inferiority will be apparent. The Moon passes Venus on the 17th.

Mars is on the meridian on the 1st at a quarter before one in the morning, and on the 25th at thirty-eight minutes past ten at night. His motion is retrograde through about twelve degrees. On the 1st he is near to the first of the Virgin; and he daily recedes from this position in a direction towards the third of the Virgin, one of the five stars in Triangle: but he stops far short of that star. The Moon passes him on the 28th.

Jupiter is a morning star too near the Sun to be visible during the former part of the month; and at the latter end he is so near to the horizon at Sun-rise, that he will not be much noticed. The Moon passes him on the 13th.

Saturn is on the meridian at half past three in the morning of the 1st, and at fifty-five minutes past one on the 25th. On the 1st he

rises about eleven at night, in south-east by east, and of course at an earlier hour every successive evening. His motion is retrograde through about a degree and a half, passing by the thirteenth and the second of the Scorpion. Antares under him, and the two stars of the Balance to the west of him, will call our attention. The Moon passes him on the 4th in the morning.

Herschell is longer above the horizon than Saturn, and moves with a retrograde motion through a degree and a quarter, being nearly midway in the line between the first of the Balance and the eleventh of the Virgin. The Moon passes him on the 2d.

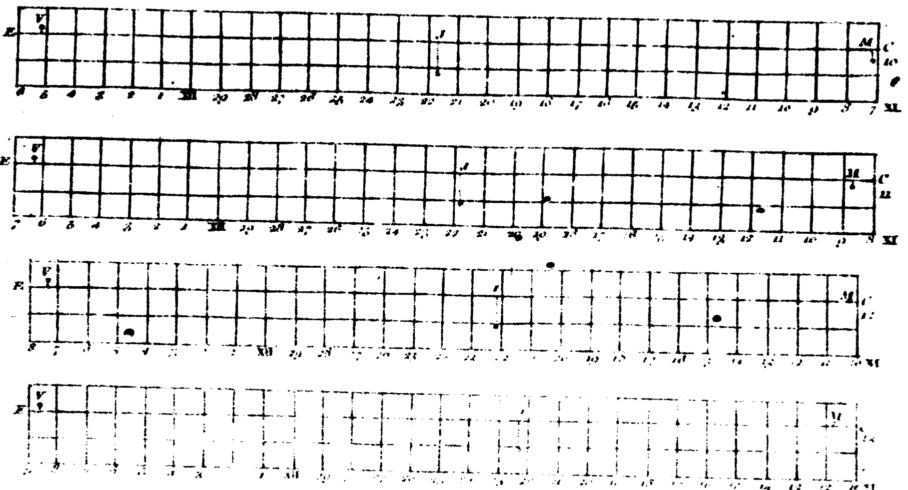
The Sun's apparent diameter on the 1st is thirty-two minutes two seconds, and on the twenty-fifth thirty-one minutes forty-nine seconds. The Moon's apparent diameter first increases, then decreases, and lastly increases. On the 1st it is thirty-two minutes fifty-six seconds, but on the 2d thirty-three minutes two seconds; then it decreases to the 18th, when it is twenty-nine minutes thirty-two seconds; and increases

afterwards to the end of the month, when it is thirty-three minutes twenty-six seconds.

TABLE OF POSITIONS.

Pos	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
II.	6	48	6	22	5	53		
III.	8	37	8	11	7	42	7	13
IV.	10	58	10	32	10	3	9	34
V.	0	49	0	23	11	54	11	25
VI.	2	45	2	19	1	50	1	21
VII	4	45	4	19	3	50	3	21
VIII			6	24	5	55	5	26

PLATE III.



MAY, 1809.

WHEN we are delighted with the splendour of the Moon, shining at its meridian height, the stars near it are lost in the blaze; and the brightest of our noblest planets is in a very great degree weakened. If all the planets and all the stars were collected in one spot, their collective light would weigh very little against that of the bright queen of heaven. How much inferior, however, is the light of the Moon to that of the Sun! If the whole heaven were covered with Moons, the light received from them would not equal that of the Sun, even in a winter's noon. All the attempts made to collect the rays of the Moon into the smallest focus, have not been capable of exciting the least sensation of heat. Yet is the light of the Moon and of the stars beneficial to mankind; and the succession of their splendour to adorn the night, gratifies us with objects suited to the contemplative mind.

The difference in the splendour of the Moon

in summer and in winter is very perceptible. In the winter its meridian height is the greatest; and at midnight, when at its full, its rays falling upon us more directly, and the sky receiving no light from the solar beams, its brightness far surpasses that at any time in summer. For in summer its greatest meridional height is small; and the twilight lasting through the night, the solar beams have at all times considerable power on the air. We are not so sensible of this difference as the inhabitants of a region, supposed to be far less favoured than ourselves, in the place allotted to them on this globe. They who live within the arctick circle, perform their long journies over the snow, during the appearance of the Moon above their horizon, and scarcely lament at those times the absence of the Sun. They have comforts and employments suited to the season of the year; and in their frosty nights and clear skies, both Moon and stars shine with a high degree of lustre.

The brightness of the Moon and stars is said also to be much greater in the torrid zone than in our regions, and two causes operate to produce such an effect. First, the twilight is of very short duration, and the meridian height of the

Moon is always very considerable, and it is frequently vertical, or directly over their heads. Since, however, so much is said of the brightness of these heavenly bodies in climates distinguished by very great heat and very great cold, and in which the meridional height of the Moon is so very different, we should apprehend that we must make more researches into the effect of air upon light, before we can reconcile these apparent contradictions. If we were asked, then, at what time in the year, and at what place, the Moon would appear brighter than at any other place, at any other time, we should have difficulties to encounter, which in our present imperfect knowledge cannot easily be overcome.

Suppose that the Moon went in a circle round the Earth, the Earth being the center of that circle, and the Earth went round the Sun, the Sun being the center of its circle; then, if the brightness of the Moon depended only on the rays it reflected, and the eye were placed in the center of the Earth, its surface not impeding the rays of light, then at every full Moon its splendour would be equal. For in this case nothing interferes to vary its brightness, but the quantity of

its surface illuminated; and this quantity would be always the same on the full Moon.

Now let us suppose every thing as before; but instead of the observer being in the center, let him be fixed on some spot on the Earth's surface. Two other causes present themselves to our consideration; the difference occasioned by its meridional heights perpetually varying, and the variety of its situations at the time of full Moon. If the meridional heights at night were always the same, and the Moon were always at its full, when at its meridional height, then its brightness would always be as before, at full Moon. But the same full Moon may take place at different times of the day and night, and of course its brightness will be very different at one full Moon, from what it is at another; and perhaps it will take the revolution of several years for the Moon to be seen to shine with the same brightness, when at the full. In all cases, her greatest brightness would take place at some time near the full, but the exact time would not easily be discovered.

We have fixed the spectator in one single spot;

but let us suppose now, that there are spectators all over the Earth, and it is the question, to which of these, and at what time, will the Moon appear to be the brightest. We do not consider now the state of the air or any cause in the Earth; but the apparent path of the Moon in its nightly round will be different, according to the latitude of the place; and of course the brightness of the Moon will be very different at the same time to the various inhabitants of the Earth. To some indeed it will not be visible, when to others it is shining in full meridian splendour. We have for each to consider the quantity of surface illuminated, and the angle at which it is seen; and these considerations make the problem not a little intricate.

But, if we could overcome all those difficulties, two more still remain, which even in this supposed easy state of the problem, would overthrow our endeavours. These are the heights of the barometer and the thermometer for every day of the year. As these are the measures of the weight of the air and its heat, and both these causes operate, I have no doubt, upon the brightness of objects seen through the air, we must form some supposition to regulate their motions.

But previously a standard is to be fixed upon, and we must have some measure for the brightness of our supposed full Moon, when the thermometer and barometer are of a certain height; and we must know how the variation of these instruments would affect the brightness of an object. This is, I fear, a difficult task, and it has not been undertaken, I believe, by any philosopher. Light, the first production of the Almighty fiat, gladdens us every day; but its nature has hitherto eluded all our researches. The Sun shines, and its beams animate the world; they are reflected to us by the Moon; they pierce our atmosphere; but what are they? What are the effects which the air, in its different states, has upon them? What is light?

> That holy light, offspring of heaven, first born,
> Which was before the Sun; and, at the voice
> Of God, as with a mantle, did invest
> The rising world of waters, dark and deep,
> Won from the void of formless infinite!

To my readers I leave the solution of these questions. I proceed to examine what appearances the heavens will display to us this month, and at the end of that time may be prepared to investigate our problem in another form.

On the 1st, the Moon rises under the thirteenth of the Scorpion and Saturn, having passed the star seven minutes before one in the afternoon, and the planet at one. The planet and the star are very near to each other; and during the night the Moon, the second and the first of the Scorpion, form a very pleasing groupe. On the 2d she rises at a considerable distance from the first of the Scorpion, and this star with the second, and Saturn to the west of her, during the night will attract attention. On the 3d the distance between Saturn and the Moon will be perceived to be very considerably increased, and during the night her progress will be above the small stars in the head of the Archer, which she passes in the course of the day; and on the 5th she rises in the morning, being soon after followed by the two first stars in the Goat, as she passes the second, or lowest of these stars, at twenty-nine minutes past two in the afternoon. On the 6th she rises in the morning under the two first stars of the Goat. On the 7th she rises under the second of the Water-bearer, the two first stars of the Goat being at a considerable distance from her to the westward. On the 8th she rises under the four small stars in triangle of the Water-pot; and as she mounts the heavens, it will be perceived that

she will reach the line, passing through the two western of the four stars in Square, before her next rising. On the 9th she rises under the four stars in Square, and nearly in a line with the two eastern of these four stars; and on the 14th is new Moon, at four minutes past twelve, but without an eclipse, as she is now a degree and three quarters from the ecliptick, which she passed on the 12th.

On the 16th, soon after Sun-set, the Moon is perceived to be between the Horns of the Bull, the Pleiades, and Aldebaran, sinking under the horizon, and Venus being very near to it. Mercury is so near to the horizon, that he will scarcely be observed: the keenest observer must look for him near the north-west by west. On the 17th the Moon is seen, at her first appearance, under the seventh, twelfth, and thirteenth of the Twins, and she passes between the thirteenth and the third before Sun-rise: at nine o'clock she is fifty-four degrees fourteen minutes and a half from the first of the Lion. On the 18th she is above the third of the Twins, having passed the line between the third and second of this constellation: above her, almost in a line between her and the second, is the fourth;

and nearer to her the sixth of the Twins. At nine o'clock she is forty-two degrees twenty-five minutes from the first of the Lion, who is to the east of her.

On the 19th the Moon is at her first appearance to the east of the line between the second of the Twins and the first of the Lesser Dog; but she has not reached the line drawn through the two first stars of the Twins and produced: she is directing her course to the two first stars of the Crab. At nine o'clock she is thirty degrees thirty-one minutes from the first of the Lion. On the 20th she is near, but to the west of the two first stars of the Crab: she passes the first at fifty-seven minutes past ten, and the second first at midnight: above her, therefore, we shall notice the stars in the Lion, and much nearer to, but below her, the small stars in the head of the Hydra. At nine o'clock she is seventy-one degrees thirty-eight minutes from the first of the Virgin; and in looking to this star, we shall notice Mars to the west of it, as the first of the Lion is to the east of the Moon.

On the 21st we perceive the Moon is under the first of the Lion, directing her course to the

seventeenth of this constellation, which she passes at forty-nine minutes past five of the next morning; and during the evening the groupe formed by the principal stars of the Lion, the Moon, Mars, and the first of the Virgin, cannot fail of exciting attention: from this latter star she is distant fifty-nine degrees ten minutes, at nine o'clock. On the 22d the Moon is on the meridian at nineteen minutes past six, and when she first appears, will be seen under the stars in the Lion, being nearly in a line with the first of the Hydra and the second of the Lion. At nine o'clock she is forty-six degrees twenty-one minutes from the first of the Virgin. On the 23d she is on the meridian at six minutes past seven; and when the stars appear, is seen under the second of the Virgin, the greater part of the stars in the Lion being to the west of her: to the east of her, Mars and the first of the Virgin will excite our attention. At nine o'clock she is only thirty-three degrees nine minutes from this latter star. On the 24th she is on the meridian at fifty-five minutes past seven; and when the stars appear, is seen under the five stars in triangle of the Virgin: below her are the stars in the Cup and the Crow, above her Mars, and, at a greater distance to the east, the first of the Virgin. At nine she is sixty-five degrees eighteen

minutes from the first of the Scorpion; and in noticing the arc between the Moon and this star, our attention will be called to two planets, Mars and Saturn, the former being near to the Moon, the latter to the star.

On the 25th, the Moon is on the meridian at forty-seven minutes past eight, having the first of the Virgin below her to the east, and Mars above her to the west of the meridian; the fifth of the Virgin being at a considerable height above her on the meridian, the rest of the five stars in triangle of the Virgin being to the east of the meridian. At nine, when the first of the Virgin is nearly in the meridian, the Moon is forty-eight degrees thirty-six minutes from the first of the Lion to the west of her, and fifty-one degrees twenty-one minutes from Antares, or the first of the Scorpion: thus the line between the first of the Lion and the first of the Scorpion, near the horizon, passes near to interesting objects—first Mars, then the Moon, then the first of the Virgin, the two first stars of the Balance, the second of the Scorpion, and Saturn. This line may amuse our evening walks; and under the Moon we may notice the small stars in the Crow. On

the 26th the Moon is on the meridian at forty-two minutes past nine, the first of the Virgin and Mars being to the west of her, and the two first stars of the Balance to the east of her. If the evening is fine, and the horizon clear in the south, we may notice directly under her, near the horizon, the eighth of the Centaur, above which are the small small stars in the head of this Constellation. At nine o'clock, she is sixty-three degrees four minutes from the first of the Lion, and thirty-seven degrees three minutes from Antares to the east of her. In this position the Moon, the first of the Virgin, and Mars, on one side of the Balance, may be contrasted with the first and second of the Scorpion and Saturn near the horizon, on the other side of the Balance. On the 27th, the Moon is on the meridian at forty minutes past ten, the first of the Balance being to the west of her at a small distance, as she passed this star at forty minutes past four in the afternoon. Still further to the west is Herschell, as she passed him at five minutes past seven this morning. Above her to the east of the meridian is the second of the Balance. In this position we notice how considerably she is removed from Mars and the first of the Virgin

to the west of her, while she has approached towards Saturn and the first of the Scorpion; and this groupe cannot fail of giving pleasure to the attentive observer. On this day she passed the eclip tick early in the morning; but for evident reasons without suffering an eclipse: at nine o'clock she is seventy-five degrees and a half from the first of the Eagle, and seventy-seven degrees fifty-seven minutes from the first of the Lion. On the 28th, the Moon is on the meridian at forty minutes past eleven, the second of the Scorpion being to the west of her, and the thirteenth of this constellation being actually behind her, as this star is at this time suffering an occultation: Saturn is a little above her, and the second of the Scorpion below her. To the east of the meridian is the first of the Scorpion. The Moon is too near its full for the common observer to notice the beginning and end of the occultation of the thirteenth, which touches the eastern rim of the Moon at forty-four minutes and a half past ten, when the star is four minutes north of the Moon's center, and the star emerges from the western rim at fifty-four minutes past eleven, when it is three minutes north of the Moon's center. At nine o'clock she is sixty-one de-

grees fifty-one minutes from the first of the Eagle to the east, and thirty-nine degrees twenty minutes from the first of the Virgin to the west of her; and at midnight she is sixty degrees ten minutes from the first of the Eagle, and forty-one degrees fourteen minutes from the first of the Virgin.

On the 29th, is full Moon at eighteen minutes past eight in the morning, but without suffering an eclipse, as she is now nearly two degrees and three quarters in her upright north of the ecliptick: soon after her rising we shall observe that she has removed considerably from Saturn, this planet with the two first stars of the Scorpion being to the west of her, and forming with her during the night a very pleasing groupe. At nine o'clock, she is fifty-four degrees thirty-six minutes from the first of the Virgin, and at midnight fifty-six degrees thirty one minutes from this star. On the 30th, she rises very considerably to the east of the two first stars of the Scorpion and Saturn, being soon after followed by the twelfth of the Archer: at nine o'clock she is sixty-nine degrees and three quarters from the first of the Virgin. On the 31st she rises above the small stars in the head of the Archer, and as she mounts the heavens

is perceived to be evidently directing her course to the second of the Goat: at midnight she is forty-one degrees thirty-two minutes from Antares, or the first of the Scorpion.

Of the planets we have opportunities of observing four—Mars, Saturn, Herschell, and Venus: the others are either morning stars, or too near the Sun to be well observed. Mercury is a morning star in the beginning, and an evening star in the end of the month; his superior conjunction taking place on the 12th, at half past seven in the morning; of course he will not be seen in the early part of the month, but by the keen observer; and in the latter end of the month, namely from the 25th, he will adorn the heavens towards the north-west by west, and will be seen for a considerable time after Sun-set. On the 25th he is under the second of the Bull, being about four degrees from him; the Moon passes him on the morning of the 14th.

Venus is an evening star in the beginning, and a morning star towards the end of the month, her inferior conjunction taking place

on the 24th at twenty minutes past seven in the morning. On the 2d she is stationary; on the first she is nearly in a line with the Pleiades and the second of the Bull; and half way between them, and in this position nearly, she keeps for some time, and for many evenings will adorn the heavens towards the west northwest. As her inferior conjunction is within a week of the end of the month, she will be seen as a morning star by very few observers, and her progress will then be noted to have been towards the Pleiades, under which stars she is at the end of the month. The Moon passes her on the 15th.

Mars is on the meridian on the 1st, at nine minutes past ten, having above him the third, fourth, and fifth of the Virgin, three of the five stars in triangle in that constellation, and below him to the east of the meridian the first of the Virgin. On the 20th he is on the meridian at three quarters past eight, having directly above him the third of the Virgin: on this day he is stationary, so that we may, during this month, remark his different motions by his positions every night with respect to the

third and first of the Virgin: before the 20th he is retrograde; and after that day his motion is direct: the Moon passes him on the 25th.

Jupiter is a morning star, and moves with a direct motion through about six degrees and a half, passing under the small stars in the band of the Fishes: the early riser will note him in the east. The Moon passes him on the 11th.

Saturn is on the meridian at half past one in the morning of the 1st, and at three quarters past eleven on the night of the 25th. His motion is retrograde two degrees and three quarters. On the 2d he passes the thirteenth of the Scorpion, this star being thirty-two minutes to the south of him; and we may from this time note his passage, though slow, above the second of the Scorpion. The planet, with the first and second of the Scorpion and the small stars of this constellation, form a very pleasing groupe during the whole of the month. The Moon passes him on the 1st, and again on the 28th.

Herschell is on the meridian, on the 1st, at

forty-six minutes past eleven, and at twenty-five minutes past ten on the twenty-first at night. His motion is retrograde through nearly a degree and a quarter, and he is constantly approaching towards the eleventh of the Virgin, being nearly in a direct line with that star and the first of the Balance. From the former of these stars he is distant about three degrees and a quarter on the 1st, and about two degrees only on the last of the month. The Moon passes him on the 1st.

The apparent diameter of the Sun on the 1st is thirty-one minutes forty-six seconds; and on the 25th, thirty-one minutes thirty-seven seconds. The Moon's apparent diameter first decreases, then increases, and lastly decreases. On the 1st it is thirty-three minutes twenty-two seconds; it then decreases; and on the 15th is twenty-nine minutes twenty-eight seconds: it increases to the 29th, when it is thirty-three minutes thirty-two seconds; and at the end of the month it is thirty-two minutes fifty-eight seconds.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
IV.	9	7	8	40				
V.	10	58	10	31	10	0	9	28
VI.	0	54	0	27	11	56	11	24
VII.	2	54	2	27	1	56	1	24
VIII.	4	59	4	32	4	1	3	29
IX.					6	4	5	32

JUNE, 1809.

OF all the substances, that we are acquainted with, light is that, whose wonderful properties are the most difficult to be clearly apprehended. The minuteness of its particles and their prodigious velocity both confound us. We are not surprised at a cannon-ball piercing through the air, or dashing through the water; yet we know that its motion is considerably impeded by both substances: but, if we were to charge our cannon with loose and minute grain, the particles would dissipate at the discharge, and all of them fall very short of the space which the cannon-ball passed over. A particle of such grain bears a much greater proportion to a cannon-ball, than a particle of light does to a particle of grain. What then must be the nature of that force, which is continually throwing out these particles of light, and what the nature of the particle of light, that traverses both air and water?

The particles of light are diffused from the Sun in every direction. Myriads of them enter our eye every day. We know what pain the smallest substance is capable of giving the eye, if by accident blown into it; yet these myriads of particles of light striking the eye, so far from exciting sensation of pain, are received during the day without the least notice. They can however excite something like pain, and this cause must be looked for in their motion and size; for if we sleep in a room with window-shutters, and the light has been carefully excluded—on the opening of the window-shutter, if the eye is directed to it, the light will be so powerful, that some time elapses, before we can view objects with our usual satisfaction. It is not at all a matter of surprise, that pain should be felt in this instance: what astonishes us is, that the eye can be brought to bear at all the action of light. The ray of light proceeds, we are told, and we have every reason to believe it, in a right line from the Sun: if it reaches the remotest planet, it is there absorbed or reflected: if we see that planet, we are sure that the ray must have travelled many millions of miles. In its way back, it must travel also in a straight

line, and of course must traverse the direction of myriads of myriads of rays, continually emitted from the Sun. How comes it then to us? Is it not wonderful, that it is not driven out of its course by the direct solar rays?

If we consider the fixed stars, and reflect that each of them, like the Sun, is emitting rays to us; how is the mind astonished at the number of rays perpetually crossing each other, and yet without apparent confusion. When the telescope is directed to the heavens, myriads of stars appear, which are not perceptible by the naked eye. What a distance then must the particles of light have passed over before they come to us! The rays, by which they strike our eye, so as to make the object visible, must have traversed in a direct line the direction of innumerable rays of the Sun, and rays reflected from the Moon and planets. Still there is no apparent confusion. We see every object distinctly; the stars have been observed by numberless spectaters; their places have been noted down by accurate observers; and yet, in the lapse of ages, no change has taken place among them which can be attributed to any alteration in the progress of their rays.

In questions of this kind, it is difficult to bring the subject completely within our comprehensions; and when we feel the difficulty of the solution, the grand point is—by some easy mode to make the subject familiar to our minds. When we talk of rays crossing each other in every direction, the mind is overpowered by the thought; and we cannot conceive, that they should thus cross each other without mutual shocks, and throwing the whole into confusion. In this state of the question the mind is bewildered; and according to the maxim which I have long considered to be of great importance in every proposition presented for our assent—

What cannot be conceiv'd,
Cannot be believ'd—

we must render the conception easy; and the belief, if the thing is true, will readily follow.

Let us try then this great question by something more familiar to us; and our patent-paper will here perhaps befriend us. Suppose a hundred persons stood in a right line, each at

a yard's distance from his neighbour; and in a right line on the left of this stood another file of men, each at a yard's distance from his neighbour in this line. Let the distance of the first man in the first column be a yard from the point where the two lines meet, and let the distance of the first men in the second column be half a yard from this point. At the word of command, let the men in each column march straight forward, quick time; moving over one foot at each step: and if they can, let them move over one hundred yards in this manner. It is the order, that, if any one touches another in this march, both shall stand still. Now, how many will be standing still after the time of taking a hundred steps, and how many will march over his whole distance of one hundred yards, without touching or being touched by any one in his march?

Every part of this march may be presented in a familiar manner to the eye. Take a sheet of the patent-paper, and let the line at the bottom of the sheet be taken for the line of the first column, and the upright line at the left hand of the sheet be taken for the second column. In each of the divisions of the first line

place a pin; and in the middle, between every two adjoining divisions of the second line, place also a pin, but of a different size. The pins thus standing up will represent the men in each column. Let the pins in the first line be moved so as to make three marks in one division, and at the same time the pins in the second line are to be moved in the same manner. It is evident, that in the first three steps we need attend only to the two pins that are nearest to each other in the two lines, for none but they can touch each other in this first move, and the experiment will show us, that they do not. The next three moves will place our pins in a different point of view: whether any will touch in this progress, I leave you to determine. When you have made a number of these movements, the aspect of the pins may perhaps be very different from what you at first apprehended.

After having tried the question completely in the manner above pointed out, let all the pins be brought back to their first positions; and now, moving them as before, when you have brought them to the end of one division, let a row of pins be placed in each line in the

places of the former pins, and let them be moved like the others. In the same manner let another row of pins be placed in each line to take the places of the former pins, and so on continually. Thus you may represent to yourself the march of columns of men from each line in succession without end; and the aspect of the paper will show you, whether they have or not in their motions interfered with each other; and if they have, what has been the consequence? I leave you to satisfy yourselves on this head by an easy experiment; and perhaps without pains you may choose to perform it with pen and ink, or any other easy device. In the mean time we may consider the appearances, that take place during this month, among our moving heavenly bodies.

On the 1st, the Moon rises nearly at the same time with the second of the Goat, as she passes this star at forty-four minutes past ten; but being on the horizon we shall not perceive her passage between the two stars—the first and second of the Goat. As she mounts the heavens, however, she will with these stars form a pleasing object during the night. On the 2d she rises soon after these two stars,

which are now at some distance from her to the west; and as she mounts the heavens, we perceive to the east of her the second of the Water-bearer. On the 3d she rises very near midnight; and as she mounts the heavens during the morning of the 4th will be perceived to be under the first of the Water-bearer and the four stars in triangle of the Water-pot.

On the 5th she rises in the morning; and as she mounts the heavens will be seen nearly in a line drawn through the two western of the four stars in Square and produced, the four stars in triangle of the Water-pot being above her to the West. On the 6th she traverses the space between the lines produced through the two western and two eastern of the four stars in Square, but she does not reach the line produced through the two eastern of these stars. On the 7th she is perceived to have passed the line produced through the two eastern of the four stars in Square; but she does not reach the fourth star of the Fishes till after Sun-rise; as she passes this star at twelve minutes past six in the morning. On the 8th, she rises soon after the three first stars of the Ram; and as she mounts the heavens we may

notice these stars to the east, and the four stars in Square to the west of her. On the 9th she rises under the three first stars of the Ram; and as she mounts the heavens we notice to the east of her, Venus the harbinger of day, towards whom she is directing her course.

On the 10th, she is perceived to have made considerable approaches towards Venus and the Pleiades; but she does not reach them before Sun-rise, passing Venus on this day at twenty-two minutes past nine at night; of course we shall perceive her on the morning of the 11th to the east of Venus and the Pleiades; and it being so near the new Moon, we leave her for the present, observing only that the new Moon takes place on the 13th, at forty-two minutes past three in the morning. There will be no eclipse on this day, as the Moon is nearly four degrees in its upright, south of the ecliptick.

On the 15th, the Moon again enlivens our evening walks, being under the two first stars of the Twins and Mercury, and forming with these stars and the planet a beautiful groupe in the north-west by west. At nine o'clock

she is thirty-three degrees twenty minutes from the first of the Lion. Before she sets, we may remark three planets above the horizon, Mercury and Mars in the western, and Saturn in the eastern hemisphere. On the 16th, she is perceived to be at a considerable distance from the two stars in the Twins and Mercury, and at nine o'clock is twenty-one degrees twenty-four minutes from the first of the Lion. On the 17th she is to the east of the two first stars of the Crab; and under those in the head of the Lion: the groupe now in the heavens will amuse our evening walk. In the north-west by west, Mercury with the two first stars of the Twins near the horizon in the west, the Moon with the first of the Lion, and the stars in his head; towards the south-west by south, Mars with the first of the Virgin; and in the south south-east Saturn, with the two first of the Scorpion. At nine she is sixty-two degrees and a quarter from the first of the Virgin.

On the 18th the Moon is under the body of the Lion, and to the east of the sixteenth; the first of this constellation being above her to the west. The groupe formed by her, the first, third, fourth,

and second, will attract our notice; and we shall be led from it to Mars and the first of the Virgin. From this last star she is distant, at nine o'clock, forty-nine degrees forty-one minutes. On the 19th her distance from the first of the Lion is considerably increased; and the groupe formed by her, and the first, third, fourth, and second of the Lion, takes a very different aspect from that last night. At nine she is thirty-six degrees fifty-one minutes from the first of the Virgin. On the 20th she is under the five stars in triangle of the Virgin, being at her first appearance nearly in the line with the second of the Virgin and the second of the Lion. To those who have noted her path for the two last days, it is evident that she is directing her progress towards Mars; and at nine she is twenty-three degrees forty-two minutes from the first of the Virgin. On the 21st she is seen to have approached near to Mars, who is nearly in a line with her and the first of the Virgin: the five stars in triangle of the Virgin are to the west of her, the third being the nearest to her. Our attention in our evening's walk will naturally be fixed on the groupe formed by the *Moon*, *Mars*, and the first of the Virgin, on the western side; and Saturn, with the two first rs of the Scorpion, on the eastern side of

the meridian: at nine o'clock she is fifty-six degrees five minutes from Antares, the first of the Scorpion; and forty-three degrees fifty-one minutes from the first of the Lion.

On the 22d the Moon is seen to the east both of Mars and the first of the Virgin, as she passed Mars at three minutes past four in the morning, and the first of the Virgin at forty minutes past two in the afternoon; she is nearest therefore to the first of the Virgin; and the groupe this evening will form a pleasing contrast to that of the preceding night. At nine o'clock she is forty-two degrees twenty-one minutes from Antares, and fifty-seven degrees forty-three minutes from the first of the Lion. On the 23d she is on the meridian at nineteen minutes past eight, having to the west of her the eleventh of the Virgin and Herschell; the star she passed at nine minutes before one, and the planet at sixteen minutes past three in the afternoon; and she is now evidently directing her course towards the first of the Balance, to the east of the meridian: Mars and the first of the Virgin are at a considerable distance from her. At nine she is twenty-eight degrees twenty-three minutes from Antares, and seventy-two degrees from the first of the Lion.

On the 24th the Moon is on the meridian at sixteen minutes past nine, having to the west and above her the two first stars of the Balance: the first she passed at twenty-one minutes past two in the morning. She is now just quitting the oblong of the Balance: below her, to the east of the meridian, are the two first stars of the Scorpion and Saturn. The first of the Virgin and Mars are nearly in the middle between two grouges worthy of notice; the one near the horizon near the west, consisting of the stars in the Lion; the other near the meridian, consisting of the two first stars of the Balance, the second of the Scorpion, Saturn, and Antares. At nine o'clock she is sixty-seven degrees thirty-three minutes from the first of the Eagle to the east of her, and thirty-two degrees fifty-four minutes from the first of the Virgin to the west of her. On the 25th the Moon is on the meridian at seventeen minutes past ten, having Saturn and the second of the Scorpion to the west of her, and Antares nearly below her. She is travelling at a very great rate, so that her distance from Saturn is considerable, though she passed him only at six minutes past four in the morning: from her first appearance, and that of the stars, we cannot fail of being struck with the groupe near her. At nine o'clock she is fifty-four de-

grees nineteen minutes from the first of the Eagle, and forty-seven degrees fifty-four minutes from the first of the Virgin.

On the 26th the Moon is on the meridian at twenty minutes past eleven, being now at a very considerable distance from Saturn and the first of the Scorpion, but not so far from the small stars in the head of the Archer. At nine she is sixty-three degrees three minutes from the first of the Virgin. On the 27th is full Moon at seven minutes past three in the afternoon, but there is no eclipse, as she is four degrees and a half in her upright north of the ecliptick. She is followed soon after her rising by the small stars in the head of the Archer, which, from her superior brightness, will scarcely be visible: she is directing her course to the second of the Goat. At nine o'clock she is thirty-three degrees nineteen minutes from the first of the Scorpion. On the 28th she is followed soon after her rising by the two first stars in the Goat, but she does not reach them before Sun-rise. At nine o'clock she is forty-eight degrees from the first of the Scorpion. On the 29th the two first stars of the Goat are to the west of her, as she passed the second at forty minutes past eight this morning. On the 30th

she is perceived at her rising to have removed very considerably from the two first stars in the Goat, and to have above her the second star of the Water-bearer, and to the east the first of this constellation, with the four stars in triangle of the Water-pot.

This month is favourable to observations on Mercury; and besides him we have three other planets, Mars, Saturn, and Herschell, above the horizon during the evening. The other two, Venus and Jupiter, are morning stars.— Mercury is an evening star during the whole month, being at its greatest elongation on the 13th, when he is near the fourth of the Twins. His path is in the constellation of the Twins, in which he moves through only between twenty-three and twenty-four degrees. On the 1st he is above the seventh and twelfth of this constellation, from which he is directing his course to the fifth, which he passes on the 5th, the star being then only five seconds and a half to the north of him. Above him therefore are the two first stars of the Twins, who, with him, will form a beautiful groupe to be observed in our evening walks between west north-west and north-west by west. Unfortunately he is proceeding now

southwards, and passes the ecliptick on the morning of the 19th; so that when he is stationary on the 27th, then being in the right line between the second of the Twins and the second of the Lesser Dog, he is so near the horizon at Sun-set, that he will be noticed only by curious observers. They, however, who have seen him on the first of the month will, if it is fine weather, have frequent opportunities for several successive nights of seeing him in considerable splendour. The Moon passes him on the morning of the 15th.

Venus is a morning star, too near the Sun to be much noticed in the beginning of the month, but her distance from him is daily increasing. On the 15th she is stationary, of course her motion will be very slow during the whole month, being first retrograde and then direct, moving first from the Pleiades, and then in a line towards the Hyades. The Moon passes her on the evening of the 10th, at twenty-two minutes past nine.

Mars is on the meridian on the 1st, at eight o'clock in the evening, and on the 19th at one minute past seven. His motion is direct through

eight degrees and three quarters. On the 1st, when on the meridian, he is almost directly under the third of the Virgin, one of the five stars in triangle in that constellation; and he is moving to a point above the first of the Virgin, though he does not come to within three degrees of this star this month. The Moon passes him on the morning of the 22d, at three minutes past four.

Jupiter is a morning star, at such a distance from the Sun, that he will be taken for the morning star, generally so called; and at the latter end of the month, Venus being to the east of him, these two bright morning stars will attract the attention of the early traveller. His motion is direct nearly five degrees, being on the first near to the sixth of the Fishes, that star being fifty-eight minutes to the north of him: the three first stars of the Ram are to the east of him, at a considerable distance, and his path is through a desolate region. The Moon passes him on the night of the 7th.

Saturn is on the meridian on the 1st, at a quarter past eleven at night, and on the 19th at fifty-six minutes past nine. His motion is retro-

grade through nearly two degrees; and we shall observe it by his distance increasing from the second of the Scorpion. The groupe by him, the second and first of the Scorpion, will be a pleasing object in our evening walks. The Moon passes him at six minutes past four in the morning of the 25th.

Herschell is on the meridian at thirty-nine minutes past nine on the evening of the 1st, and at a quarter past eight on the evening of the 21st. His motion is retrograde, through less than three quarters of a degree; of course we shall discover him by looking to the east of the eleventh of the Virgin, towards which star he is directing his course; and we may remember that this star is above the line drawn from the first of the Virgin to the first of the Balance, but nearest to the first of the Balance. The Moon passes him at sixteen minutes past three on the afternoon of the 23d.

The Sun's apparent diameter on the 1st is thirty-one minutes thirty-five seconds; and on the 25th thirty-one minutes thirty-one seconds. The Moon's apparent diameter first decreases, then increases, and lastly decreases. On the 1st it is thirty-two minutes forty-six seconds; and

on the 11th twenty-nine minutes twenty-eight seconds; it now increases to the 26th, when it is thirty-three minutes twenty-six seconds, and then decreases to the end of the month, finishing at thirty-two minutes six seconds.

TABLE OF POSITIONS.

Pos.	1		8		15		23	
	h.	m.	h.	m.	h.	m.	h.	m.
V.	8	55	8	26	7	57		
VI.	10	51	10	22	9	53	9	20
VII.	0	51	0	22	11	53	11	20
VIII	2	56	2	27	1	58	1	25
IX.	4	59	4	30	4	1	3	28
X.			6	25	5	56	5	23

*** For the description of the above positions, see the volume for 1806.

JULY, 1809.

THE prodigious velocity of light, and the minuteness of the particles of which it is composed, are subjects sufficient to strike the strongest mind with astonishment. The instance we gave last month, of the ease with which much larger bodies may be made to move without interrupting each other's motions, may lead us to conceive what may take place in our system; yet we should take care not to be too positive in such a difficult subject. We have seen that a hundred thousand men in one line, may be followed by files of an equal number without end, and these may be traversed by an equal number of men in their march, without the least interruption of their motions. We say that the thing can be conceived, not that it can be reduced to practice; as we have not the powers requisite to observe the strict order that such an experiment would require.

Suppose now, that in our lines, instead of men we placed small pins erect, each pin the smallest that has been made, and each distant from the other only one tenth of an inch. Let them, in three movements, pass over each a tenth of an inch, then it is evident that their motions will not be at all injured in one line, by the transverse motions of the pins from the side line. Each pin would go its direct course without the least interruption; and it matters not at what rate the pins were moved, whether quick or fast, whether a tenth of an inch in a second, or a thousand miles in a second; still, as they are all supposed to be moved uniformly, they would pass each the other without the slightest interruption. We have supposed small pins to be fixed in our lines, and their points will of course occupy a very small part of space. Small as that portion is, it is very great compared with the space which would be occupied by a particle of light. Yet what is true of these pins' points, would be equally true of the much smaller particles of light; and though we should suppose a million particles of light, placed between pins' points and pins' points continually, yet these particles of light might perform their rapid motions in the same manner, without interfering with each other.

But, supposing that some of the particles of light by impinging against each other should be driven out of their course, what would be the result? Not the prevention of the particles behind them from following their course, since by the impact, the two particles would each be placed out of the line in which they were moving. The particles behind would continué their course, therefore, unless they met with a similar interruption; and supposing very frequent interruptions of this kind, yet still the rapidity and number of the particles from every luminous body is such, that some rays would be continually coming to our eyes, which could not be at all sensible of the cause of the little changes that might have been made in the progress of the particles to the eye.

We have here imagined only a motion on one plane, but the same will be true in motions on planes intersecting each other in various directions. However numerous the luminous bodies may be, in consequence of the vast velocity of light, and the number of its particles, sufficient rays may come from the remotest body to excite in us a sensation. The subject is doubtless very intricate, and hard to be conceived; yet we have something analogous to it in common life. In a large assembly a confused mur-

mur is heard around us; yet in spite of the clamour, a clear voice frequently pierces through the whole, and is heard by all who are attending to the quarter whence it proceeded. This fact, which is a very common one, it is very difficult to explain, when we consider the undulations of the air; and should imagine, that the undulations in one direction would completely injure those in another direction. The theory of sound has thus its difficulties; but since in a concert, notwithstanding the noise around him, it is possible for a person to direct his attention to a particular instrument, we need not be surprised, if rays of light can in a similar manner cross each other; and various observers will perceive different objects more or less distinctly, according to the attention which they pay to them.

In all the theories of light, it is supposed, that particles are emitted in straight lines from the luminous body, and the Sun is supposed to be the great fountain of light in our system. Various notions, however, have prevailed respecting this immense body; and whilst some have supposed it to consist of fire, others have asserted that it is composed of very different elements. The fact is, that we judge entirely from ourselves, and from what we see upon this Earth:

but, as we cannot form any idea of what any of the planets are composed, much less can we ascertain what enters into the composition of the Sun. Because we have fire upon the Earth, it does not follow that there is fire, or any thing like fire, in any other part of the system. We cannot be too cautious how we assert any thing positively, when we have not within our reach the means of ascertaining the fact. The point is of so great consequence, that we repeat again the illustration of our sentiment, taken from Arrowsmith's excellent map of Africa, who has delineated properly the parts, with which we are acquainted, or of which any information has been given; but the interior is a perfect blank. We know nothing of it; and it is better to confess this ignorance, than to fill the mind with idle conjectures. Thus we know nothing more at present of the Sun, than that, when we are on the part of the Earth opposed to it, we have the sensation of both light and heat; and since, when we are on the contrary side, the light and heat are diminished, according as rays from the Sun have less effect on the atmosphere, we cannot doubt, that both light and heat owe much of their force to the Sun. How these effects are produced, it is not easy for us to ascertain; whether by particles, as it is said, emitted from the

Sun; or whether, as is more probable, from the action of the Sun on the substance of light, which is universally diffused through our system. Future ages may determine this point for us. We will now attend to motions, which we could not thus easily foretell, if past ages had not communicated to us their observations.

On the 1st the Moon rises under the four stars in triangle of the Water-pot; and during the night, they would be particularly remarked near her, if not obscured by her superior splendour. On the 2d she is perceived to be in the space between the lines produced through the two eastern and the two western of the four stars in Square, but being nearer to the latter line. As she mounts the heavens after midnight, the traveller by night will observe how the lines drawn from each of the two western of the four stars in Square through the Moon to the horizon, bear upon a bright star near it, which he will remember to be Fomalhaut. On the 3d she is perceived at her rising to be nearly in a line between the two eastern of the four stars in Square; and during the morning of the 4th, those stars being above her, will call our attention; but she does not pass the line drawn through the highest western and lowest eastern of these stars before Sun-

rise. On the 5th she rises in the morning, and is soon after followed by Jupiter; to the east of whom are the three first stars of the Ram.

On the 6th the Moon rises after Jupiter, having passed him before noon of the preceding day: above her are the three first stars of the Ram, and she is nearest to the third of these stars. As she mounts the heavens, Jupiter being to the west, and Venus considerably to the east of her, will form a pleasing groupe before Sun-rise. She passes the eclipstick on this day before noon, but for obvious reasons without an eclipse. On the 7th she rises under, but at a considerable distance, from the three first stars of the Ram, the Pleiades rising nearly at the same time with her. The groupe around her before Sun-rise, formed by the first of the Whale, Jupiter, the three first stars of the Ram, the Pleiades, Venus, Aldebaran, and the Hyades, will give brilliancy to the eastern part of the heavens. On the 8th she is followed soon after her rising by Venus, with Aldebaran, and the Hyades; and as she mounts the heavens, the Pleiades above her, with the other objects, cannot fail of attracting notice. She passes Venus this day in the evening, and of course the two fourths of the Bull,

being small stars of the Hyades, before midnight. On the 9th she rises nearly at the same time with Aldebaran, having passed the fifth of the Bull, or the Bull's-eye, at forty-three minutes past one this morning: Venus is now to the west of her, and the early riser cannot but be gratified with the objects near the Moon. On the 10th she rises at a considerable distance from Venus and Aldebaran, Jupiter being now at a considerable distance from her to the westward. On the 12th is new Moon, at thirteen minutes past six in the afternoon; but the Sun suffers no eclipse, as she is nearly five degrees in her upright, south of the ecliptick.

On the 14th we may renew our acquaintance with the Moon in our evening walk, but we must look near to the horizon for her soon after Sun-set. It may be amusing to notice the fineness of the Crescent, which in early times was an object eagerly sought after, and probably gave rise to the base worship in high places, of which we read so much in the Holy Scriptures. The first of the Lion is above her. On the 15th we observe to the west of her the seventeenth of the Lion, which she passed at nineteen minutes past five in the evening. Above her is the first of the Lion to the

west, and she is directing her course to Mars, very considerably to the east of her. At nine she is fifty-two degrees thirty-two minutes from the first of the Virgin. On the 16th we notice above her the second of the Lion, and to the west the first of this constellation; to the east of her, Mars and the first of the Virgin: from this latter star she is distant thirty-nine degrees forty-six minutes at nine. On the 17th she is under the second of the Virgin, the nearest of the five stars in triangle of this constellation; to the east of her, Mars and the first of the Virgin; to the west, the first of the Lion will now attract notice. At nine she is twenty-six degrees, forty-six minutes from the first of the Virgin.

On the 18th the Moon is seen under the third of the Virgin, one of the five stars in triangle of that constellation; to the east of her, the first of the Virgin and Mars; and if the evening is fine, we cannot fail to have observed how Mars has changed his situation with respect to the latter star. At nine she is fifty-nine degrees twenty-six minutes from Antares, or the first of the Scorpion, to the east of her; and in noticing this distance we shall fix our attention for a little time on Saturn in his neighbourhood, though at

some distance to the west of him. On the 19th, she is seen, at the appearance of the stars, near to the first of the Virgin, as she passes this star at six minutes past nine this evening. Her recess from this star, and approach to Mars, forms a pleasing object, as long as she is above the horizon. At nine she is forty-six degrees five minutes from the first of the Scorpion. On the 20th she is seen to the east of the first of the Virgin and Mars: the planet she passed at twenty-five minutes past seven this morning, and of course is at some distance from him in the evening. She is near, but to the east of the eleventh of the Virgin, as she passed this star at fifty-five minutes past seven; and as she will pass Herschell at nine minutes past ten, she will at nine be nearly midway between the star and the planet. If the night is fine, any observer may now mark the position of this distant planet, and with a telescope discover him on a future night, when the Moon is at a greater distance from him. At nine she is thirty-two degrees thirty-three minutes from Antares, between whom and the Moon we cannot fail of noticing the first of the Balance and Saturn.

On the 21st, the Moon is seen to the east of the first of the Balance, having passed this

star at fifty-one minutes past nine this morning. She is directing her course towards Saturn; and this planet, with the first and second of the Scorpion to the east of her, and Mars and the first of the Virgin to the west of her, will amuse our evening walks. The rapid motion of Mars, compared with the slow progress of Saturn, has already excited attention. Each planet has a star near it, by which their comparative motions may be tolerably well ascertained. At nine she is seventy-one degrees forty-nine minutes from the first of the Eagle to the east of her, and eighty-one degrees fifty minutes from the first of the Lion to the west of her. On the 22d, she is on the meridian at fifty-nine minutes past seven; being to the east of Saturn and the second of the Scorpion. The planet she passed at fifty-two minutes past ten this morning. The groupe formed by the planet, the second of the Scorpion, the Moon, and Antares, will now excite attention. At nine she is fifty-eight degrees fifty-seven minutes from the first of the Eagle, and forty-two degrees and a half from the first of the Virgin. On the 23d, she is on the meridian at fifty-nine minutes past eight, the space now between her

and the first of the Virgin being marked with distinguished objects;—Mars near to the star; the two first stars of the Balance nearly in the middle space; Saturn, the second and first of the Scorpion, nearest to the Moon. To the east of her, at a considerable distance, the two first stars of the Goat: to the second, or lowest, she is directing her course. At nine she is ninety-one degrees eighteen minutes from the first of Pegasus to the east of her, and fifty-seven degrees ten minutes from the first of the Virgin.

On the 24th the Moon is on the meridian at ten, having travelled at a very great rate since last night, as will be observed by her present distance from Saturn and Antares; and near the horizon in west south-west are Mars and the first of the Virgin. Below her are the twelfth and eleventh of the Archer, the eleventh directly, the twelfth to the west of the meridian. Of course the small stars in the head of the Archer are to the east of her; and, at nearly three times their distance, the two first stars of the Goat. At nine she is seventy-seven degrees five minutes from the first of Pegasus, and seventy-two degrees from

the first of the Virgin. On the 25th, she is on the meridian at eleven, having above to the east of her the two first stars of the Goat, and below to the west of her the small stars in the head of the Arches. At nine she is sixty-two degrees fifty-five minutes from the first of Pegasus, and forty-one degrees forty-six minutes from Antares. On the 26th, is full Moon at fourteen minutes past ten at night, but without an eclipse, as the Moon is nearly five degrees in her upright north of the ecliptick. At her rising, she is to the east of the second of the Goat, as she passed this star at fifty-eight minutes past six in the afternoon; but her superior splendour will prevent us from seeing distinctly the two first stars till towards morning. At nine she is forty-nine degrees three minutes from the first of Pegasus, and fifty-six degrees sixteen minutes from Antares. On the 27th, she is seen at her rising to be at a considerable distance from the two first stars of the Goat, having above her the second of the Water-bearer. On the 28th, she rises under the first of the Water-bearer, and during the night she passes under the four small stars in triangle of the Water-pot. On the 29th, she rises nearly in a line with the two eastern of the four stars

in Square; having the four stars in triangle of the Water-pot above her to the west. On the 30th, she rises under the four stars in Square, passing the line drawn through the two eastern of these stars before Sun-rise; and on the 31st she rises nearly at the same time with the three first stars of the Ram; and as she mounts the heavens, these stars to the east of her, and the four stars in Square, will excite our attention. Jupiter to the east of her will adorn the heavens before midnight.

Mercury is in his inferior conjunction on the 10th, at half past ten in the evening; and of course will be too near the Sun to be visible, till after the middle of the month; when we must look for him in the morning. He is stationary on the 21st; and then from his position being south of the ecliptick, he is near the horizon at Sun-rise, being then under the sixth of the Twins. The early riser will be gratified with a sight of him, half an hour before Sun-rise, near the east north-east; and carrying his views westward, will compare with him Venus and Jupiter; whose light is not to be overpowered by that of the dawn. On the 28th he has advanced towards the fourth of the

Twins, and rises under it on the 31st. For the ten last days he will be seen by many observers. The Moon passes him on the 12th.

Venus is a morning star during the whole of the month, and will shine with great splendour at a considerable height in the heavens. Her motion is direct through somewhat more than twenty-four degrees, and her track is in a conspicuous part of the heavens. On the 1st, she has above her the Pleiades, and to the east of her the Hyades and Aldebaran. On the 9th, she is among the Hyades, and near to this latter star. There are two stars near it, called each the fourth of the Bull. The first fourth she passes within nine minutes, the star being to the north of her; the second she approaches so near to, as to be said to be in contact with it. Astronomers at different parts of the world will direct their glasses towards this planet, to observe accurately her passage by these stars. The commonest observer cannot fail of noticing so brilliant a sight, as is presented to us by a planet and a star of the first magnitude so near to each other. On the succeeding mornings we may notice her recess from the two fourths, and passage above Aldebaran; and Jupiter to the west

will add to the beauty of the prospect. As she recedes from Aldebaran her course is bent to a point under the sixth of the Bull, or tip of the southern horn; and she is higher every morning in the heavens at the same time; and at the end of the month is seen near to and under this star. About an hour and a half before Sun-rise the east will be resplendent with the first and third of Orion near the horizon, and Aldebaran and Venus above them. The Moon passes her on the 8th.

Mars is on the meridian at twenty-seven minutes past six in the afternoon of the 1st, and at forty-four minutes past five in the afternoon of the 19th; of course we look for him towards the western hemisphere in our evening walks. We shall find him on the 1st near to, but to the west of the first of the Virgin, and his motion by this star will gratify us for several evenings. He is moving to a point under the tenth and eleventh of the Virgin, but he does not pass the latter star this month. His motion is direct through a little more than fifteen degrees. The Moon passes near to him at twenty-five minutes past seven on the morning of the 20th.

Jupiter is on the meridian at three quarters after six on the morning of the 1st, and at a quarter past five on the morning of the 25th: of course we look for him in the eastern hemisphere in the mornings, though he rises very near midnight on the 1st, and earlier every successive night. His motion is direct through two degrees and three quarters, being in a desolate region to the east of the small stars in the band of the Fishes, and having the three first stars of the Ram to the east of him. His splendour will, however, ennoble this region, and with Venus and Mercury interest many astronomers in the morning. The Moon passes him on the 5th.

Saturn is on the meridian at three minutes after nine in the evening of the 1st, and forty-eight minutes past seven on the 19th. His motion is retrograde through three quarters of a degree. To the east of her is the second of the Scorpion, and below her the eleventh of the Balance. Thus we have Mars, Herschell, and Saturn to amuse our evening walks, and the early riser will be gratified with observations on Mercury, Venus, and Jupiter. The Moon passes Saturn on the 22d before noon.

Herschell is stationary on the 15th, being then to the east of the eleventh of the Virgin. On the 1st he is on the meridian at thirty-three minutes past seven in the evening, and on the 21st at eleven minutes past six. During the whole month, therefore, he is in a favourable aspect to be discovered. The Moon passes near to him on the 20th, at nine minutes past ten in the evening.

The Sun's apparent diameter, on the 1st, is thirty-one minutes thirty-one seconds; and on the 25th thirty-one minutes thirty-three seconds. The Moon's apparent diameter first decreases, then increases, and lastly decreases. On the 1st it is thirty-one minutes fifty-two seconds: it decreases to the 9th, when it is twenty-nine degrees and a half: from this time it increases to the 24th, when it is thirty-three minutes four seconds; and at the end of the month it is thirty minutes forty seconds.

TABLE OF POSITIONS.

	1		8		16		25	
Pos	h.	m.	h.	m.	h.	m.	h.	m.
VI.	8	47	8	18	7	46	7	10
VII	10	47	10	18	9	46	9	10
VIII.	0	52	0	23	11	51	11	15
IX.	2	55	2	26	1	54	1	18
X.	4	50	4	21	3	49	3	13
XI.			6	22	5	50	5	14

⁎ For the description of the positions, see the volume for 1806.

AUGUST, 1809.

IN contemplating the world in which we live, a natural curiosity is excited to know, what fills that space, in which such immense bodies are moving. We are certain, that light is diffused throughout the whole; and the resistance it can make to the motion of a large body is so small, that but little difference would take place, if the planets moved only in empty space. The light comes to us through a medium, which prevents us from judging, what is the nature of that light in itself. As the fish in the sea must, from living in a denser medium that we do, have different ideas of light from ourselves, and their eyes are adapted to their peculiar situation; so we, living in the air—a denser, or at any rate a very different medium perhaps from that, which surrounds other planets—may receive very different sensations of light from those of the inhabitants of these planets.

If we had no atmosphere, if we did not live in air, and had no similar medium around us, the rays of light would act very differently upon this globe, and we should be, with our present faculties only, little capable of performing our duties upon it. The rays from the Sun would make an impression upon the eye directed towards it; but, when the back was turned to it, and there was no object near to reflect his rays to us, we should be in utter darkness. On one side would be the blaze of day, and on the other the darkness of night; and we may easily conceive how such sudden transitions must affect us.

The air extends to a certain height above us—a height, which is variable; and in the upper regions its waves may be kept in by a lighter surrounding fluid, just as those of the ocean are by the surrounding element of air. However great may have been the agitation of the sea, when the wind ceases, the waves grow gradually smaller; and at last exhibit only the undulating surface excited by the rise and fall of the tides. Similar tides prevail in the air; and the height of the atmosphere consequently varies. The half of our globe, which

is presented to the Sun, receives his rays, as they pass through the air, some coming directly, but others obliquely upon it in every direction. The oblique rays, which would not come to the eye of a spectator from his position with respect to the Sun, are reflected by the upper part of the atmosphere; and hence the twilight exists, when the Sun is below the horizon, and continues till he has got to such a depth, that no ray, passing through the air round the one half of the globe, can by any means come into the air on the other half globe, which is opposite to the Sun.

If we knew the height of the atmosphere, and the nature of air precisely at different heights from the surface of the earth, we might tell the exact duration of twilight in any part of the earth at any time of the year; but though we should know the precise time, when the twilight ends, it by no means follows, that we should be able to discover the height of the atmosphere. Such are the difficulties attending our situation, enough to humble the wisest among us; and they are surely sufficient to prevent any one from talking dogmatically upon these subjects.

For example — in the Holy Scriptures we read, that light was the first thing that, by the command of the Almighty, emerged from the mighty chaos, in which for unknown ages the heavens and earth had existed. Soon after, the prophetick writer informs us, that the Sun was ordained to give light upon the earth. How can these two things be reconciled, says the philosopher. If there was light before the Sun, how could the Sun be ordained to give the light to the Earth? We would ask the philosopher to explain to us, before he finds fault with Revelation, what light is; and when he has satisfied his own mind upon this subject, he may not find it so difficult to comprehend, that light may exist independently of the Sun, though the Sun or some other body may be necessary to act upon it, so as to produce the sensation of light in us. A common candle might suffice to remove the philosopher's objection. It gives light, we say, in our rooms every night; but how does it give us this light? The room was dark; but by the striking of a flint against a steel, a spark is produced, and by this we communicate, to speak in common language, light to the candle; and from the candle, light, different indeed from that of the Sun and Moon,

is diffused throughout the room. But was not the light in the room before the striking of the flint, and the communication of the spark to the candle? If it was not, we shall be obliged to the philosopher, to explain to us how it was produced. The Sun is as necessary for the action of light upon us in the day, as the candle is for a similar action in a room at night; but this is no reason, that the substance of light did not exist independently of either. Philosophy must not go beyond its bounds; and it treads on dangerous ground, when it attempts to interfere with Revelation. Let us now consider the motions of the lesser light, ordained to run its course in our heavens.

On the 1st the Moon rises just before Jupiter, and to the east of her are the three first stars of the Ram. During the night, her passage by that planet will excite attention from observers. On the 2d, she rises under the three first stars of the Ram; and as she mounts the heavens is seen between these stars and the small stars in the head of the Whale: Jupiter is now to the west of her. On this day she passes the ecliptick, being in her descending node, or going from the north to the south of

that line, but without producing an eclipse for obvious reasons. On the 3d she rises nearly at the same time with the Pleiades; and as she mounts the heavens is perceived to be near the middle of the triangle formed by these stars, the three first stars of the Ram, and the small stars in the head of the Whale. Jupiter heading this groupe, and Aldebaran bringing up the rear, will before Sun-rise fix our attention. On the 4th, she rises under the Pleiades, and is soon after followed by Aldebaran and the Hyades; and mounting the heavens during the morning of the 5th, will be seen to direct her course towards the fourth of the Bull; but she does not pass there till after Sun-rise, the first fourth at twenty-six minutes past five in the morning, the second fourth at fifty-eight minutes past five. At forty minutes past ten in the morning she passes the fifth of the Bull or the Bull's-eye, the brightest star near Aldebaran in the direction from that star to the Pleiades. On the 6th she rises in the morning, but very near midnight, and nearly at the same time with Aldebaran, now to the west of her. As she mounts the heavens, our attention is drawn to Venus to the east of her; and Aldebaran, the Moon, Venus, and the

first and third of Orion, adorn the eastern part of the heavens. Jupiter near to the meridian will give lustre to the scene; and if the horizon is clear towards the east north-east, Mercury will add his splendour to the whole. On the 7th, she is perceived to have approached much nearer to Venus, but does not pass this planet till after Sun-rise. Before Sun-rise we may notice the groupe formed by Venus, the Moon, the two first stars of the Twins, and Mercury. On the 8th, she rises under Venus and the seventh and twelfth of the Twins; and before Sun-rise is perceived to pass the line between the third and first of this constellation, the third being near to her; and on the 11th is new Moon at thirty-three minutes past seven in the morning without an eclipse, as she is above four degrees in her upright south of the ecliptick.

We hail the re-appearance of the Moon on the 13th. When she appears under the second of the Virgin, the most western of the five stars in Triangle, she is so near the horizon that she will escape the inattentive in their evening walks, though they cast their eyes towards the west. On the 14th she is seen under the five

stars in triangle of the Virgin, but nearest to the seventh of this constellation, the first being at some distance to the west of her, and Mars still further removed. Our attention will be called to the space between her and the first of the Scorpion, as in it are two planets, one star of the first, and three of the second magnitude. On the 15th we perceive her to have approached near to the first of the Virgin, Mars being at a considerable distance from her; and the Moon with the first of the Virgin will, with Mars and the first of the Balance, form appearances to call our attention. Further to the east, Saturn and the second of the Scorpion form a third pair of a similar nature. At nine she is forty-nine degrees seven minutes from Antares. On the 16th she appears under the ten and eleventh of the Virgin, the first being below and to the west of her, as she passed this star at thirty-one minutes past two in the morning: Mars and the first of the Balance are to the east of her. At nine she is thirty-five degrees forty-two minutes from Antares. On this day she passed the ecliptick, being in her ascending node, or moving from the south to the north of that line.

On the 17th, the Moon, Mars, and the first of the Balance, form a pleasing groupe. Above them is the second of the Balance; to the west, the first of the Virgin; to the east, Saturn, the second of the Scorpion, and Antares. At nine she is seventy-four degrees forty-nine minutes from the first of the Eagle. On the 18th, she is seen to be above Saturn and the second of the Scorpion. The planet she passed at twenty-one minutes past five after noon. Mars is to the west of her. Antares below and to the east of her. At nine she is sixty-two degrees twelve minutes from the first of the Eagle. On the 19th she is on the meridian at fifty-two minutes past six after noon; and when the stars appear, Saturn, the second and first of the Scorpion will appear to the west of her. The space between her and the first of the Balance being distinguished by two planets, will naturally excite our attention. At nine she is forty-nine degrees fifty-two minutes from the first of the Eagle.

On the 20th, the Moon is on the meridian at fifty-one minutes past seven, having below her to the east of the meridian the twelfth of

the Archer, and of course further to the east the small stars in his head; and she is directing her course to the two first stars of the Goat. Above her at a considerable height are the small stars in the Bull of Poniatowski to the east of the meridian, and still higher to the west the first stars of the Serpent-bearer and Hercules: to the west of her are the two first stars of the Scorpion, Saturn, Mars, the two first stars of the Balance, and the first of the Virgin; this latter star being near the horizon in the west south-west. At nine she is eighty-one degrees thirty-five minutes from the first of Pegasus. On the 21st, she is on the meridian at fifty-one minutes past eight, having directly under her the small stars in the head of the Archer, and to the east of her the two first stars of the Goat. To the west of her are the two first stars of the Scorpion, with Saturn near the south-west; Mars and the first of the Balance near the horizon in south-west by west. At nine she is thirty-six degrees forty-four minutes from Antares, and sixty-seven degrees forty-nine minutes from the first of Pegasus.

On the 22d she is on the meridian at forty-nine minutes past nine, the two first stars of the Goat being so near to her to the east, that

she will evidently pass them before Sun-rise. At nine she is fifty degrees fifty-one minutes from Antares, and fifty-four degrees ten minutes from the first of Pegasus. On the 23d, she is on the meridian at three quarters past ten, the two first stars of the Goat being now below her to the west of the meridian, and the second of the Water-bearer above her to the east of the meridian. At nine she is sixty-five degrees one minute from Antares, and forty degrees fifty-seven minutes from the first of Pegasus. On the 24th, she is on the meridian at thirty-eight minutes past eleven, having directly above her the first of the Water-bearer, and of course to the east the four small stars in triangle of the Water-pot; to the west of her, the second of the Water-bearer. At nine she is seventy-nine degrees two minutes from Antares and sixty-eight degrees fifty-one minutes from the first of the Ram.

On the 25th is full Moon, at three minutes past seven in the morning, but without an eclipse, as she is upwards of four degrees in her upright north of the ecliptick. She rises under the four small stars in triangle of the Water-Pot. At nine she is fifty-five degrees fourteen minutes from the first of the Ram. On the 26th she is seen at her rising to be in the space between the lines produced through the

two western and two eastern of the four stars in Square, the third of the Fishes being directly above her. As she mounts the heavens, we perceive to the east of her Jupiter, and to the east of him the three first stars of the Ram. At nine she is fifty-seven degrees forty-seven minutes from the first of the Eagle. On the 27th, she rises under the four stars in Square, having passed the line drawn through the two eastern of these stars: Jupiter is the most distinguishing object to the east of her, as she mounts the heavens; at nine she is sixty-nine degrees thirty-four minutes from the first of the Eagle.

On the 28th, she is followed soon after her rising by Jupiter, the three first stars of the Ram being to the east of her. At nine she is eighty-one degrees and a quarter from the first of the Eagle. On the 29th, she passes the ecliptick in her descending node in the morning, but for obvious reasons without producing an eclipse. Jupiter rises nearly at the same time with her, whom she is perceived to have passed. Above her are the three first stars of the Ram. On the 30th we perceive her, as she mounts the heavens, to be near

the middle of the triangle formed by the three first stars of the Ram, the Pleiades, and Menkar; and Jupiter to the west and Aldebaran to the east of this groupe, will be a pleasing object during the night. On the 31st, she is seen to have advanced much nearer to the Pleiades, and is followed after her rising by Aldebaran, with the Hyades; all these objects, the former above and the latter below her, will fix the attention of the observer during the night: before morning, Venus to the east, and Jupiter to the west of her, will add considerably to the interest of the scene.

Mercury is in his superior conjunction on the 25th, at eleven o'clock in the morning, and of course is a morning star to that time; being visible in the earlier part of the month, but soon escaping the notice of any but the keen observer. On the 1st, Mercury, Venus, Jupiter, and the Moon, will an hour before Sun-rise decorate the eastern hemisphere. Above Mercury are the two first stars of the Twins; and we may now compare the brilliancy of four stars of the first magnitude, with that of three of the planets. The Moon passes Mercury on the morning of the 10th.

Venus is a morning star, and at her greatest elongation on the 2d. On the 1st, we perceive her near to the sixth of the Bull, or tip of his southern horn, and she is directing her course to the thirteenth of the Twins; which star she passes on the 12th, this star being fifteen minutes to the south of her. We shall therefore notice on this, and on the two preceding days, the seventh and twelfth of the Twins above, and below her the third. She directs her course to the sixth of the Twins; which star she passes on the 20th, the star being fourteen minutes to the north of her; and her course now lies towards the fourth of the Crab, but she does not arrive at the line drawn through the two first stars of the Twins, and produced before the end of this month. The Moon passes her on the 7th in the morning.

Mars is an evening star, being on the meridian on the 1st, at eighteen minutes past five in the afternoon, and on the 19th at fifty-one minutes past four. On the 1st, he is under the tenth and eleventh of the Virgin, being nearly midway between the first of the Virgin and the first of the Balance; and he is directing his course to the tenth of the Balance.

From the 13th to the 19th, we perceive him passing under the first of the Balance; and on the 26th he passes the first ninth, this star being twenty-seven minutes south of him: he thence directs his course to the fourth of the Scorpion. During the latter part of the month, the two first stars of the Balance, with Saturn, Mars, and the two first stars of the Scorpion, form a distinguished groupe in the south-west. The Moon passes him on the 17th.

Jupiter is on the meridian on the 1st at fifty minutes past four in the morning, and on the 19th at thirty-nine minutes past three. He rises on the 1st between ten and eleven, and before the end of the month between eight and nine. He will therefore be observable for the most part during the whole night; and as on the 15th he is stationary, he will be near the same place during the whole month; as he does not move half a degree from it in his retrograde motion after having reached that point, and he was nearer to it on the 1st. The small star near him is the fifteenth of the Fishes; and in a right line between him and the second of Andromeda we meet with the small stars in one of the Fishes. To the east

of him are the three first stars of the Ram. Venus, on the 1st, is nearly sixty degrees to the east of him, and that distance is daily increasing. The Moon passes him on the night of the 1st.

Saturn is stationary on the 1st, and after that time his motion is direct, but of course slow, moving through about three quarters of a degree. On the 1st, he is on the meridian at fifty-six minutes past six; and on the 19th at forty-nine minutes past five after noon. Of course we have favourable opportunities of seeing him in the south-west in the evening. To the east of him is the second of the Scorpion, above him the eighth, and below him the eleventh of the Balance. Mars is to the west of him on the 1st, distant about twenty-four degrees, and that distance is daily decreasing. The Moon passes him on the 18th.

Herschell is on the meridian on the 1st, at twenty-nine minutes past five; and on the 21st, at a quarter past four after noon. His motion is direct through somewhat more than fifty minutes. We still find him by looking for

the eleventh of the Virgin, and to the east of this star. Mars will be a further direction in the first week, as he is moving under Herschell; but on the 5th gets to the east of him. The Moon passes Herschell on the 17th.

The Sun's apparent diameter on the 1st is thirty-one minutes thirty-five seconds; and on the 25th, thirty-one minutes forty-three seconds. The Moon's apparent diameter first decreases, then increases, and lastly decreases. On the 1st, it is thirty minutes twenty-eight seconds, and it decreases to twenty-nine minutes thirty-six seconds, which it is on the 6th: it then increases to the 21st, being then thirty-two minutes thirty-eight seconds; after which it decreases to the end of the month, finishing at twenty-nine minutes forty-six seconds.

TABLE OF POSITIONS.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VII.	8	42	8	15	7	45	7	12
VIII.	10	47	10	20	9	50	9	17
IX.	0	50	0	23	11	53	11	20
X.	2	45	2	18	1	48	1	15
XI.	4	46	4	19	3	49	3	16
XII.					5	55	5	22

SEPTEMBER, 1809.

WE took notice, last month, of the futile objection made against Revelation by philosophers; who, without knowing the nature of the subject which has excited their objections, presume to set their probabilities in competition with the declarations of Scripture. This leads us to consider two characters, equally injurious to truth—the one which sets up his imperfect knowledge as a standard, and rejects Revelation, when not agreeable to that standard; the other affecting the utmost regard to Revelation, disdains every discovery of philosophy, which disagrees with his own misinterpretations of Scripture. Thus one character finds fault with the first chapter in Holy Writ, because light is there said to have been formed before the Sun: the other character rejects demonstrable truths; such as the motion of the earth, because he fancies that the Scriptures have asserted that it is immoveable.

Both their errors may be traced to the same source—their own fault in not ascertaining the bounds of each division of instruction. The Bible was not intended to be a book of natural philosophy; nor is it the province of natural philosophy to enter into the mysterious ways of Providence, in the government of the moral world. The works of nature will occasionally be alluded to, or strong figures will be taken from them by the inspired writers, yet they will use the common language of the country; and speak of the Sun's rising and setting, just as we do in common life; without entering at all into the fact of the real motions in nature. They draw their figures from the appearances of things; and it is unreasonable in the extreme to interpret their words by the strict letter. Thus, when our Saviour says, according to the usual mode of allegorising in his country, I am the door, or I am the vine; how absurd must not those people appear to be, who should think that our Saviour was converted into a vine; and yet many persons have fallen into as ridiculous mistakes on several parts of Scripture.

The Bible, we say, was not given to us to

teach us philosophy: and, if the works of nature are introduced, as in the case of the first chapter of Genesis, in a didactive manner; this is to guard against some evil, into which mankind had or might have fallen. Thus we find it was an early and a very prevalent errour in mankind, to pay divine homage to the two great luminaries in the heavens, and to ascribe to their sole influence all the benefits of light. Revelation, by these luminaries, called the attention of the Israelites to a much more ennobling sentiment. They are not the authors of light. Immense as these bodies are, they were ordained by the great Creater to occupy certain stations, for certain purposes — they were instruments in his hands, to dispense only that light, which had previously sprung forth at his command. Thus, the true Israelite was guarded from a pernicious errour. He could not fall into those abject terrours, which seized the heathen world, when the brightness of the Sun or Moon was changed into a colour like that of blood. He lamented the degradation of mankind, which could fall down before a mass of inanimate matter, and worship the creature instead of the Creater; who is over all, God blessed for ever.

Happy would it have been for mankind, if they had always used the Scriptures in the manner for which they were designed. Philosophy and religion would then never have been at variance; and they would have mutually assisted each other. Philosophy would have acknowledged its obligations to religion, for the finest feelings of the heart: the religious man would have gratefully received the daily discoveries made by philosophy in the works of nature. At this day, how little is known with respect either to light and heat! and many ages may elapse, before any great addition is made to the ideas entertained upon these subjects, by the least enquiring mind. Yet we see, that the materials for improvement are continually increasing; and, from what has been done in the three last centuries, we may augur, that the unborn philosophers, who will hereafter speculate on these subjects in the vast regions of America, at present uncultivated, may be as able to treat of light and heat, as our best chymists can at present on platina, gold, and silver.

Two circumstances may encourage us to incline to this opinion. Within these few years,

two new sciences, as it were, have sprung up — electricity and galvanism. At present they are, and may be expected to remain, for a considerable time, in a very imperfect state. Yet the assiduity still employed upon them, will gradually unfold new truths; and, as the human mind is prepared for additional knowledge, new objects will arise for its contemplation. In the mean time, the same caution is necessary in every step of the future progress of mankind; and every fantastical idea should be carefully rejected, whilst each sober suggestion will be examined with the utmost attention. Thus, at present, the idea thrown out, that all the rays, proceeding from the Sun, are not capable of exciting heat, is not to be at once rejected. There is nothing inconsistent in this idea. The rays, we know, are capable of a division; by which we perceive the variety of colours, that adorns the objects of nature. Future times may be able still further to separate these rays; and it will be discovered, how far the power of communicating light, is connected with that of communicating heat; and how far both are affected by the medium of air, through which they pass to make an impression upon us.

It is generally supposed, I believe, that the rays of the Moon do not communicate any heat to the Earth; but is the fact sufficiently ascertained? The rays of the Moon collected by any reflecter or refracter as yet used, may not have produced a change in any combustible substance or in any spirits; but it does not thence follow, that, if we could collect a much greater number of rays, we might not perceive a change. If we compare together the number of solar rays, that pass through the smallest refracter, and produces in the focus a flame, with that of the lunar rays, which have been hitherto collected; we shall easily perceive, that the experiment has not been sufficiently tried. But there may be also a vast disparity in the velocity of the solar and lunar ray; and heat may so depend upon the velocity of light, that no number of lunar rays whatsoever, though brought into the smallest focus, may produce the least effect upon the most combustible matter. The subject is full of difficulties. Let us now attend to what is within our reach; and the Moon and the planets will, by their motions, afford us sufficient objects of contemplation.

On the 1st, the Moon rises nearly at the same time with Aldebaran, having passed the principal stars of the Hyades in the afternoon; namely, the first fourth at twenty minutes after one, the second fourth at fifty-two minutes after one, and the fifth at thirty-four minutes past four. On the 2d, she rises just before the sixth of the Bull or tip of the southern horn; and during the morning of the third, she will be in a conspicuous situation over Orion: at night she rises just before midnight, under the seventh and twelfth of the Twins; being followed soon by the third of that constellation. On the 5th, she rises in the morning, and, as she mounts the heavens, is perceived to be between the two first stars of the Twins, and the two first of the Lesser Dog: Venus to the east of her adds splendour to this groupe. On the 6th, she rises under Venus and the two first stars of the Twins. On the 7th, her distance from Venus is perceived to be considerably increased; and the planet to the west, and the first of the Lion to the east of her, will fix the attention of the morning traveller.

On the 9th is new Moon, at fifty-eight

minutes past seven in the afternoon; but without an eclipse, as she is upwards of three degrees in her upright south of the ecliptick: her crescent will be noticed by few on the 10th; but on the 11th, many will observe her, to the west of the first of the Virgin. On the 12th, she is perceived to have passed the first of the Virgin, being now between this star and the eleventh of this constellation. On the 13th, she is seen, at the first appearance of the star, near to the first of the Balance; which she passes at sixteen minutes past nine, having passed Herschell in the afternoon. Saturn and Mars to the east of her will call our attention. On the 14th, she is perceived to have approached near to, and be directing her course towards Saturn and Mars, whom she will pass before Sun-rise: at nine o'clock she is sixty-four degrees fifty-nine minutes from the first of the Eagle. On the 15th, Saturn and Mars, with the second of the Scorpion, are to the west of her, and Antares is below her; and this groupe will assuredly excite our attention in the evening. At nine she is fifty-two degrees from the first of the Eagle. On the 16th she is perceived to have receded considerably from Saturn and Mars; and at nine o'clock she is eighty-four

degrees fifty-one minutes from the first of Pegasus.

On the 17th she the meridian, fifty-two minutes past six; the two planets Saturn and Mars, with the two first stars of the Scorpion, being now at a very considerable distance from her, in south-west by south. At nine o'clock she is seventy-one degrees nineteen minutes from the first of Pegasus. On the 18th, she is on the meridian, at fifty minutes past seven; the small stars in the head of the Archer being below her to the west, and the two first stars of the Goat above her, to the east of the meridian. Saturn and Mars are near the horizon in the south-west, and Jupiter is rising in east by north. At nine o'clock she is fifty-seven degrees fifty-seven minutes from the first of Pegasus. On the 19th she is on the meridian, at three quarters past eight; the two first stars of the Goat being to the west of her, as she passed the lowest at a quarter past eleven before noon. At nine o'clock she is forty-four degrees fifty-four minutes from the first of Pegasus. On the 20th, she is on the meridian, thirty-eight minutes past nine; being nearly under the second of the Water-bearer: at nine

o'clock she is seventy-three degrees twenty-six minutes from the first of the Ram; and in noticing this distance we shall observe Jupiter not far from the three first stars of the Ram.

On the 21st, the Moon is on the meridian at twenty-nine minutes past ten; the four small stars in triangle of the Water-pot being above her. At nine she is fifty-nine degrees fifty-nine minutes from the first of the Ram. On the 22d, she is on the meridian at nineteen minutes past eleven; being in the space between the lines drawn through the two eastern, and the two western of the four stars in Square, which are directly above her. To the east of her are Jupiter, and the three first stars of the Ram. At nine she is seventy-nine degrees ten minutes from Aldebaran. On the 23d is full Moon, at thirty-eight minutes past six in the afternoon; but without producing an eclipse, as she is upwards of two degrees in her upright north of the ecliptick. She rises under the four stars in Square; and Jupiter to the east of her, will, as she mounts the heavens, excite our attention. At nine she is sixty-five degrees ten minutes from the first of the Eagle.

On the 24th, the Moon rises nearly at the same time with the three first stars of the Ram; and is soon followed by Jupiter. At nine she is seventy-six degrees fifty-five minutes from the first of the Eagle. On the 25th, she rises nearly at the same time with Jupiter, whom she passed about noon: with this planet, and the three first stars of the Ram, she forms a groupe to excite attention. On this day she passes the ecliptick, but for obvious reasons, without producing an eclipse. On the 26th, she rises under the three first stars of the Ram; being removed considerably from Jupiter. As she mounts the heavens, we perceive around her the three stars of the Ram, Menkar, with the small stars in the head of the Whale, and the Pleiades. On the 27th she rises nearly at the same time with the Pleiades; being nearly in a line with these stars and the first of the Whale; as will be seen when they are high above the horizon. She is directing her course towards Aldebaran.

On the 28th, she is followed soon after her rising by Aldebaran, and is now in a remarkable place of the Hyades; for she covers, in

passing them, two of these stars. At thirty-two minutes and a half past eight, her eastern rim touches the star, called the first fourth, when it is eleven minutes and a quarter north of her center; and at eight minutes and a half past nine the star emerges from her western rim; being then eleven minutes and a quarter north of her center. At fifty-one minutes and three quarters past eight, her eastern rim touches the star called second fourth; when it is two minutes and three quarters north of her center; and the star emerges at forty-seven minutes and a half past nine from her western rim; being then two minutes and two thirds north of her center. Thus both stars are for some time behind the Moon. The fifth of the Bull is now near to her, which she passes after midnight. From her rising we shall distinguish Aldebaran near to her: her brightness and nearness to the horizon will prevent us from observing accurately the occultations. On the 29th, Aldebaran is seen to the west of her, and at some distance; and she is travelling to a point under the sixth of the Bull, or tip of his southern horn. As she mounts the heavens, we shall notice under her the splendour of Orion. On the 30th, she rises under

the sixth of the Bull, and, as she mounts the heavens, is perceived to be nearly in a line with this star and the third of the Twins: near to her on the east are the seventh and twelfth of the Twins.

Mercury is an evening star, but too near the Sun in the early part of the month to be visible to any but the very keen observer; and at the end her height above the horizon at Sun-set is so little, that we must be watchful, to catch a glimpse of him before he sets. On the 23d, he is near to the first of the Virgin; the star being only fifty-five minutes from, and to the south of him. To see the planet and the star, we must have a clear horizon, to the west south-west; and look out at twenty minutes after Sun-set.

Venus is a morning star, and will shine with great splendour long before Sun-rise. Above her are the two first stars of the Twins; but she does not on the 1st reach the line drawn through these stars and produced. She is directing her course to the first of the Lion; and on the 10th passes the fourth of the Crab; the star being to the north of her, and distant

forty-nine minutes. On the 29th, she reaches the first of the Lion; this star being then only two minutes distant from, and to the north of her. A planet of such splendour, and a star of the first magnitude, so near to each other; will be a gratifying sight to the morning traveller. In the whole she moves through about thirty-five degrees. The Moon passes her on the 7th.

Mars is an evening star, being on the 1st on the meridian at thirty-six minutes past four in the afternoon; and on the 19th, at twenty-one minutes past four. His motion is direct about twenty degrees; and he is under the line between the first of the Balance, and the second of the Scorpion. Between him and this latter star, is the planet Saturn; and his passage by that planet, will be gratifying to the attentive observer; who will notice it, particularly on the eighth and ninth days; when the two planets, with the second and first of the Scorpion, will form a pleasing groupe in the western hemisphere. On the 12th, he passes the fourth of the Scorpion; the star being to the south of him, and distant only twenty-eight minutes. Of course the second of the Scorpion is now

above him; and Saturn, the second and fourth of the Scorpion, with Mars in the middle, with the first of the Scorpion at some distance, will form the figure of a cross. On the succeeding nights, her distance from Saturn increases very rapidly; and he passes the first of the Scorpion on the 23d. The Moon passes him on the 15th.

Jupiter is on the meridian, at five minutes before three in the morning of the 1st, and on the 19th at thirty-nine minutes past one. Of course, we see him in the night, during the whole month: his motion is retrograde through little more than three degrees, moving through a barren region; and being, on the 1st, nearly in a line drawn through the second and third stars of the Ram, and produced. The Moon passes him on the 25th.

Saturn is an evening star, being on the meridian at three minutes past five in the afternoon of the 1st, and three minutes past four in the afternoon of the 19th: his motion is retrograde through little more than two degrees; being on the 1st between the eighth and eleventh of the Scorpion; and we shall

observe more particularly his motion, by noticing his increasing distance from the second of the Scorpion. In the passage of Mars by him, we shall have an opportunity of contrasting together their different colours, brightness, and apparent magnitude. The Moon passes him on the morning of the 15th.

Herschell is on the meridian on the 1st, at thirty-six minutes past three in the afternoon; and on the 21st, at twenty-eight minutes past two in the afternoon; and of course our opportunities of seeing him are every night decreasing. His motion is direct, through a degree and a half; being in a line with the eleventh of the Virgin and the first of the Balance, but little more than two degrees and a half from the former star. The Moon passes him on the 13th.

The Sun's apparent diameter is, on the 1st, thirty-one minutes forty-seven seconds; and, on the 19th, thirty-one minutes fifty-five seconds. The Moon's apparent diameter first decreases, then increases, and lastly decreases. On the 1st, it is twenty-nine minutes forty-two seconds; and on the 2d only twenty-minutes thirty-eight seconds: it then increases

to the 15th, when it is thirty-two minutes twenty-two seconds; and from this time it decreases to the end of the month: ending with twenty-nine minutes thirty-eight seconds.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
VII.	6	46	6	21	5	52		
VIII.	8	51	8	26	7	57	7	23
IX.	10	54	10	29	10	0	9	31
X.	0	49	0	24	11	55	11	26
XI.	2	50	2	25	1	56	1	27
XII.	4	56	4	31	4	2	3	33
I.	6	46	6	21	5	52	5	23

OCTOBER, 1809.

THE difficulties, in which the subject of light is involved, are, you have seen, very considerable; and it has probably occurred, that though a particle of light moves with very great velocity, yet still, the stars being at such an immense distance, the light will be a considerable time coming to us; and of course a ray, which was emitted by the star at one time in a direction to strike our eye, could not possibly act upon it, as the eye would by the motion of the Earth be carried to a very different place. This is really a difficulty, which may not very easily be solved; and yet it has led to one of the most beautiful discoveries in astronomy.

It was an objection against the Earth's motion, that, if the Earth moved, and the rays of light moved, a star could not possibly retain the same position during the whole of the year. This is evident to any one, who considers the nature of

motion, and may be tried with great ease by a common experiment. If we take a piece of wood with a trough in it, on which a ball may move freely, and a small ball is attached to a thread, then a person may with one hand draw the ball along the trough, at the same time that with the other hand he moves the trough parallel to itself on the table. Thus, by the time that the ball is moved from one end of the trough to the other, the trough itself will have moved over some space upon the table; and it will be evident, that the ball moves over a very different space from what it would have done, had the trough remained upon the table at rest. It comes indeed to the end of the trough, but that end of the trough is now from its motion at a different part of the table. Thus two motions have been imparted to the ball, the one by means of the thread, the other by the motion of the trough; and in consequence of them, its motion over the table is not in the line in which the trough first stood, nor in the line in which it would have been moved if not drawn by the thread; but it moves over a line between these two lines.

The watermen are practically acquainted with this principle. If they are to row from one side

of the river to a point directly opposite to them, of course the current will have an effect upon the boat: they know that they must row their boat in a direction, not to the point they wish to attain, but to some point above or below it, according to the current of the stream. They give the boat an impulse in one direction, the stream gives it an impulse in another; and the boat moves in neither direction, but in one which suits the purpose of the rower. In many other lines of life, the same principle is felt; and in the moral world something similar may be discovered, of which I leave to your sagacity to point out the examples.

If we know the forces with which the ball is drawn by the thread and the trough is moved, we can tell what force would be necessary to make the ball go over the line it describes on the table, in the same time in which it moved over the trough. In the same manner, if we know what is the velocity of light, and what the velocity of the Earth in its orbit, we can discover in what direction the ray will appear to be, that comes to our eye from a given star. These things have been calculated, and a wonderful consistency has been discovered between the fact and

the previous theory. Thus it is found, that all the stars, except those in the plane of the Earth's orbit or the eclipt ick, move either in a circle or in small ellipses, of which the stars' real place is the center. This curve, in which the stars appear to move, is very small. The major axis of the ellipse is only forty seconds; and of course the aberration of the star from its true place is much too small to have ever been discoverable by the naked eye.

The stars which are in the plane of the ecliptick, appear to move in small arcs of a circle, whose length is only forty seconds; and of course these stars appear in their real places twice every year. The greater the latitude of the star, the greater is its minor axis; and a star placed in the pole of the ecliptick would appear to describe a circle round its true place. How such a discovery came to be made or ascertained, may well excite curiosity; but nature is full of wonders, and wise as this generation is, or thinks itself to be, much more remains to be known; and all our boasted science will be comparative ignorance to the glories of a future generation. We will now proceed to the proper business of the month, and trace the progress of the Moon and planets among

the fixed stars as they are called, but of which so few are ever seen in their proper places.

On the 1st the Moon arises under the line between the third and sixth of the Twins, but nearest to the latter star; and as she mounts the heavens, the two first stars of the Twins are on one side; and Orion on the other side of her will attract attention. On the 2d she rises near the line between the second of the Twins and the first of the Lesser Dog; and during the morning of the 3d will be perceived to be receding from that line. On the 4th she rises in the morning before the stars each called the first of the Twins: as she passes them in the forenoon of this day, the stars in the Lion, with Venus, will call our attention to the east of her. On the 5th she is followed soon after her rising by the first of the Lion and Venus; and these three objects will fix the attention of the morning traveller. On the 6th she rises under Venus and the first of the Lion; and on the 9th is new Moon at forty-two minutes past seven in the morning; and in her passage she produces an eclipse, which is invisible to the inhabitants of this country. On the 8th, at midnight, her place was in the seventh sign, eleven degrees four minutes and a half,

and one degree eleven minutes twenty-six seconds in her upright south of the ecliptick; and on the 9th, at noon, she had advanced to the eighteenth degree six minutes and three quarters, when she was only thirty-two minutes fifty-six seconds in her upright south of the ecliptick. Her apparent diameter at midnight of the 8th was thirty-two minutes eight seconds; and at noon of the 9th thirty-two minutes eighteen seconds. The Sun's place at noon on the 8th is in the seventh sign, fourteen degrees forty-six minutes thirty-two seconds; and at noon of the 9th fifteen degrees forty-five minutes fifty-four seconds; its apparent semi-diameter being sixteen minutes three seconds and a third of a second. The eclipse will be central to those persons who are sailing in latitude sixty-one degrees forty minutes south, and in longitude fifty-five degrees and three quarters, at seventeen minutes past eight.

On the 10th, the thin crescent of the Moon will be visible to those, who have a good view of the horizon to the west of south-west by west, Mercury and the first of the Balance being to the east of her: but they are all near the horizon, when the departing light of day permits them to be visible. On the 11th she is seen above Mer-

cury and the first of the Balance, having passed the star at forty-six minutes after four in the morning. To the east of her is Saturn, with the second of the Scorpion. On the 12th she is seen to the east of Saturn and the second of the Scorpion, the first being below her, and Mars to the east of her. The groupe formed by the two stars, the two planets, and the Moon, cannot fail of attracting attention. On the 13th she has receded considerably from Saturn, and approached towards Mars; but she does not pass the latter planet before she sets. On the 14th she is seen very considerably to the east of Mars, having travelled very rapidly since last night. On the 15th she is on the meridian at fifty-four minutes past five, having to the east of her the two first stars of the Goat, and below her to the west the small stars in the head of the Archer. A line drawn from her to the south-west points out Mars, the two first stars of the Scorpion, and Saturn.

On the 16th the Moon is on the meridian at forty-nine minutes past six, the two first stars of the Goat being now near but to the west of her, as she passed between them between four and five this afternoon. At nine she is forty-seven degrees

fifty-four minutes from the first of Pegasus. On the 17th she is on the meridian at forty-two minutes past seven, the second of the Water-bearer being above her to the east, and the two first stars of the Goat below her at some distance to the west of the meridian. At nine she is seventy-six degrees forty-eight minutes from the first of the Ram; and within that distance we shall notice Jupiter. On the 18th she is on the meridian at thirty-three minutes after eight, having above her the first of the Water-bearer to the west, and the small stars in triangle of the Water-pot, to the east of the meridian. At nine she is sixty-three degrees thirty-three minutes from the first of the Ram.

On the 19th the Moon is on the meridian at twenty-one minutes past nine, having above her the two western of the four stars in Square, and below her, near the horizon, Fomalhaut. At nine she is eighty-three degrees two minutes from Aldebaran to the east of her. On the 20th she is on the meridian at nine minutes past ten, having above her the four stars in Square, the two eastern being to the east of, but near the meridian. She is directing her course towards Aldebaran, from which star she is distant, at nine,

sixty-nine degrees fifty-five minutes; and much nearer to her we shall notice Jupiter. On the 21st she is on the meridian at fifty-six minutes past ten, Jupiter being near to and to the east of her. At nine she is fifty-seven degrees from Aldebaran. On the 22d she is on the meridian at forty-two minutes past eleven, Jupiter being now below her to the west, and the first stars of the Ram above her to the east of the meridian. On this day she passes the ecliptick in the descending node before midnight, but without producing an eclipse at this instant, but being so near the full, that an eclipse may be expected.

On the 23d is full Moon at twenty-five minutes past nine in the morning, and with it an eclipse; but of course invisible to the inhabitants of this country. It begins at forty-one minutes after seven: the middle of it is at eighteen minutes past nine, and the end at fifty-five minutes past ten. Digits eclipsed are ten degrees one minute on the Moon's north limb. Her place in the ecliptick, at midnight of the 22d, is in the first sign twenty-four degrees forty minutes, and three minutes twelve seconds in her upright south of the ecliptick. At noon of the 23d she is in the second sign fifty-four minutes, and in her upright

thirty-seven minutes forty-four seconds south of the ecliptick. Her diameter at midnight of the 22d is thirty minutes twenty-four seconds, and at noon of the 23d thirty minutes eight seconds. The Sun's place at noon of the 22d is in the seventh sign, twenty-eight degrees forty minutes; and at noon of the 23d twenty-nine degrees forty minutes, his diameter being thirty-two minutes thirteen seconds.

On the 24th, the Moon is seen in the middle of the triangle formed by the three first stars of the Ram, the Pleiades, and the small stars in the head of the Whale. On the 25th, she rises under the Pleiades, and is soon followed by Aldebaran: she is evidently directing her course, so as to cover some of the Hyades. On the 26th, she rises nearly at the same time with Aldebaran, having passed this star in the day-time, and in her passage through the Hyades covered the two stars called the first and second fourth. On the 27th she rises under, but near to, the sixth of the Bull or tip of the southern horn. On the 28th, she rises under the seventh and twelfth of the Twins, and is followed by the third, now near to her; but her recess from this star will be apparent during the night. On the 29th, she rises

under the fourth of the Twins, but does not reach the line drawn through the two first and produced. On the 30th, she rises under the two first stars of the Twins, having this day at noon reached her greatest distance from the Sun's apparent path, or the ecliptick; and on the 31st she rises under the two first stars of the Crab, having passed them in the evening.

Mercury is an evening star during the whole of this month, having arrived at his greatest elongation on the 9th; being then under the first of the Balance; but he is so near the horizon at Sun-set, that he will be noticed by few observers; and if he is not seen at the beginning, the chances of seeing him at the close of the month are much less promising. The Moon passes him on the 11th.

Venus is a morning star, shining with great splendour during the whole of the month. She passes through the constellation of the Lion, and part of the Virgin. Her course is direct through about thirty-seven degrees. On the 1st she is to the east of the first of the Lion, so near to him, that these two bright objects cannot fail of catching our attention; and the superiority of a planet

over a star of the first magnitude will be apparent. On the 4th, she passes the seventeenth of the Lion, the star being thirty-five minutes and a half south of her: from this star she directs her course to the second of the Virgin, passing it on the 21st, the star being forty-four minutes to the south of her; and we may now compare her splendour with that of the second of the Lion. Being now in the triangle formed by the five stars in the Virgin, she passes on the 28th the seventh, the star being twelve minutes to the south of her. The Moon passes her on the 6th.

Mars is an evening star, being on the meridian at fourteen minutes past four in the afternoon of the st, and at four minutes past four on the afternoon of the 19th. His motion is direct through twenty-two degrees. On the 1st he is to the east of Antares, and forms with him an object worthy of attention. The difference in the colours of the star and planet, as well as their brightness, will be remarked. From this star he moves towards the eighth of the Serpent-bearer, passing it on the 9th, the star being fifteen minutes south of him: of course we shall observe near to, and above him, a nebula. He directs his course now to the eleventh of the Archer, which star he

passes on the 30th, the star being thirty-four minutes south of him. The Moon passes him on the 13th.

Jupiter is on the meridian on the 1st at five minutes before one in the morning, and on the 19th at thirty-six minutes past eleven at night; and he is in a favourable position to be observed during the greater part of each night and morning. His motion is retrograde through four degrees. He is in a desolate region, having a few small stars in the band of the Fishes to the west of him. The three first stars of the Ram are at some distance to the east from him. The Moon passes him on the 22d.

Saturn is an evening star, being on the meridian at twenty-eight minutes after three in the afternoon of the 1st, and at twenty-five minutes after two in the afternoon of the 19th. His motion is direct through little more than three degrees. On the 1st he is near to, but to the west of the second of the Scorpion, which he passes on the 6th, the star being forty-one minutes south of him. On the 20th, he passes the small star to the east of the second, called the thirteenth, the star being only a minute and a half to the south

of him. The groupe formed by Saturn and Mars, with the two first of the Scorpion, will embellish the heavens in the evening towards the south-west. The Moon passes him on the 12th.

Herschell sets so soon after the Sun, that he will not often be discovered: he is directing his course towards the first of the Balance. The Moon passes him on the 10th near midnight.

The Sun's apparent diameter on the 1st is thirty-two minutes two seconds, and on the 19th thirty-two minutes twelve seconds. The Moon's apparent diameter on the 1st is twenty-nine minutes, forty seconds; and it increases to the 12th, when it is thirty-two minutes forty-four seconds. From this time it decreases to the 28th, when it is twenty-nine minutes, thirty-four seconds; and it afterwards increases to the end of the month, ending at thirty minutes eight seconds.

TABLE OF POSITIONS.

Pos.	1 h.	1 m.	8 h.	8 m.	16 h.	16 m.	25 h.	25 m.
VIII	7	3	6	38	6	8	5	34
IX.	9	6.	8	41	8	11	7	37
X.	11	1	10	36	10	6	9	32
XI.	1	2	0	37	0	7	11	33
XII.	3	8	2	43	2	13	1	39
I.	4	58	4	33	4	3	3	29
II.					6	6	5	32

NOVEMBER, 1809.

WE have observed, that not a single star in the heavens, except those in the plane of the ecliptick, appears ever in its real place; but it is seen in an ellipse, of which the major axis is parallel to the plane of the ecliptick, and which is only forty seconds in length. This appearance arises from the nature of light, and the motion of the Earth in its orbit; and as these subjects were well known long before this discovery in the heavens, we may be surprised that it should have been made at so late a period. The astronomers, we might have imagined, would have contemplated the effects of the motion of light and of the Earth, and thence have concluded, that these two motions must have had an effect on the apparent place of the stars in the heavens. This is a wonder frequently expressed on every subject after it has been discovered. We with difficulty place ourselves in the situation of persons before the discovery; and we do not recollect how many

things are now undiscovered, which will excite wonder in posterity at our want of sagacity.

After Columbus had discovered America, there were not wanting envious and malignant persons to depreciate his discoveries. The voyage is now made with the utmost ease. Successive discoveries and improvements in navigation have made a variety of things perfectly easy, which in the time of Columbus opposed almost insurmountable difficulties. But the merit of Columbus cannot be depreciated: he had the sagacity to foresee, that by following a certain course he must come to land, and he had the courage to explore the unknown passage. Had any person considered the nature of the Earth's motion and light, and thence instituted experiments to discover their effects upon the fixed stars, he would have been entitled to the highest praise of a philosopher. But we must make a distinction between discoveries, which arise from simple observation, and those that result from philosophical investigation. New planets and new comets will present themselves to the persons who let not a night pass without sweeping the heavens with their telescopes: we are indebted to them for their labours and their discoveries; they are extending the

circle of our knowledge; they are preparing more subjects for philosophical enquiry, and for glorifying the Creater of the universe.

We know that the fixed stars are at an immense distance from us. The fact at one time required to be established; and experiments were instituted on a fixed star, with a view to discover what changes were made in its height above the plane of the Earth's orbit, in consequence of the Earth's motion. An easy application of our Earth-bead and pasteboard will show us the tendency of these experiments*. At a distance from the circle, which represents the Earth's orbit, let an object be raised at some height above the pasteboard, and let it represent a fixed star. Then through the Earth-bead pass a thread, and draw it to the object. This line will represent the direction in which the star is seen by a spectator supposed to be in the center of the Earth. As the Earth-bead is moved round in its circle, this thread is continually changing its direction, and making different angles with the pasteboard; the angle being the greatest when the Earth-bead is nearest to the supposed fixed star, and least

* See Volume for 1808, page 35.

when the Earth-bead is at the greatest distance from the supposed fixed star.

If we take two beads, and place one in the nearest place in the circle to, and the other in the place the farthest off, from the supposed fixed star; then the threads drawn from the beads to the supposed fixed star, will form an angle, and this angle will be greater or less, according to the distance of the fixed star. It was the object of the astronomer to find this angle; and if he could have done it, he would have found the distance of the fixed star from the Earth. His plan was to discover the angle made by the thread with the plane of the pasteboard; and as the angle is greatest in one place, and least in the opposite, it is evident that the place of a star in its upright must grow lower as the Earth is going from it, and higher as the Earth is going towards it. For six months of the year, then, it will appear to move in one direction, and for the next six months it will appear to move in the contrary direction.

The angle made by the two threads drawn from the Earth-beads will be less and less, as the object is removed the further from them. Supposing the object to be placed at a considerable

height, directly above the center or place where our supposed Sun is, the angle made by either thread with the pasteboard will be always the same; and consequently the angle between the two threads at the supposed fixed star will be always the same, supposing the two Earth-beads to be directly in the line passing through both and the center. Now the line on our pasteboard is small: the line it represents, or the diameter of the Earth's orbit, is nearly two hundred millions of miles. Surely such a diameter, one would say, must extend an angle at the fixed star; or what must be the distance of the star from us? If the angle made by the threads at our supposed fixed star, is half a minute, then its distance is nearly two hundred and thirty times the radius of the Earth's orbit. We are sure then, that the fixed stars are above twenty thousand millions of miles; for they are not near enough to make the angle, subtended by the diameter of the Earth's orbit to an eye in the fixed star, equal to half a minute.

To discover the angle. however small it might be, was an object of importance. An apparatus was prepared for the purpose: such, that a very slight variation might be discovered.

Of course, the first thing to be observed was, the variation, if any, after the interval of a few nights. This must be in a certain direction, according as the Earth was going to or from the star. You may easily imagine, how anxious the philosophers were to observe the state of their apparatus; and they were men worthy of such an enquiry. One was Molyneux, the friend of Locke; the other Bradley, the celebrated philosopher. I leave you to consider, what really took place; and proceed now to our usual monthly employment.

On the 1st, the Moon is seen during the morning, before Sun-rise, to the west of the first of the Lion; and on the 2d she rises in the morning, under the first of the Lion; and will be seen before Sun-rise, in a line with the first and third; passing the seventeenth at five minutes past two. On the 3d, she rises under the body of the Lion; and forms with the first and second a conspicuous triangle. On the 4th, she rises nearly at the same time with the second of the Virgin; and before Sun-rise will be seen in a right line with that star and the second of the Lion. As she rises in the sky, Venus, with the first of the Virgin, will call our attention to the

east of her. On the 5th, she rises under the five stars in Triangle; being soon after followed by Venus and the first of the Virgin. On the 6th, she rises under Venus, and nearly at the same time with the first of the Virgin, who is much nearer to her than the planet; and on this day she passes the ecliptick on the morning, but for obvious reasons without producing an eclipse.

On the 7th is new Moon, at forty-nine minutes past six in the afternoon; but without an eclipse, as she is now nearly two degrees in her upright north of the ecliptick. On the 10th, she is seen to the west of the twelfth of the Archer; and of course the small stars in his head are to the east of her. On the 11th, she is above the small stars in the head of the Archer, and bending her course towards the second of the Goat. On the 12th, she is to the east of the two first stars of the Goat, passing the second at fifty-two minutes past ten; but as she is then under the horizon, we cannot observe her passage between those two stars. On the 13th, we perceive her between the two first stars of the Goat and the second of the Water-bearer; but nearest to the latter star. On the 14th, she is under the first of

the Water-bearer and the four small stars in triangle of the Water-pot; but though she is retiring from the second, she is still nearer to that star than to any of the others: she is on the meridian on this day at thirty-one minutes past six; and at nine is sixty-six degrees thirty-three minutes from the first of the Ram.

On the 15th, the Moon is on the meridian, at twenty minutes past seven; being near the line passing through the two western of the four stars in Square and Fomalhaut; and this line she passes before Moon-set. At nine she is fifty-three degrees thirty-one minutes from the first of the Ram. On the 16th, she is on the meridian at seven minutes past eight, the two eastern of the four stars in Square being above her to the east; and the two western, to the west of the meridian. At nine she is seventy-three degrees from Aldebaran. On the 17th, she is on the meridian at fifty-three minutes past eight; the four stars in Square being above her to the west of the meridian; and Jupiter, with the three first stars of the Ram, to the east of her. At nine she is sixty degrees eleven minutes from Aldebaran. On the 18th, she is on the meridian at thirty-eight minutes after nine; Jupiter being

to the west of the meridian, below her; and the three first stars of the Ram, to the east of the meridian, above her. At nine o'clock she is forty-seven degrees thirty-six minutes from Aldebaran. On the 19th, she is on the meridian at twenty-four minutes past ten; the three first stars of the Ram being directly above her, and Menkar being below her, to the east of the meridian. Jupiter is now at some distance from her, to the west of the meridian. At nine o'clock she is thirty-five degrees thirteen minutes from Aldebaran. On this day she passes the ecliptick or Earth's path in the morning; but for obvious reasons without producing an eclipse. On the 20th, she is on the meridian at ten minutes past eleven; the three first stars of the Ram being above her to the west, and the Pleiades above her to the east, of the meridian. Directly below her is Menkar, with the three first stars of the Whale. At nine o'clock she is sixty-six degrees thirty-seven minutes from the second of the Twins. On the 21st, she is on the meridian at fifty-seven minutes after eleven, being now directly under the Pleiades; Aldebaran, with the Hyades, being below her to the east of the meridian.

On the 22d is full Moon, at fifty-seven mi-

nutes past two in the morning, but without producing an eclipse; as she is upwards of three degrees in her upright south of the ecliptick. When she rises in the evening, she will be seen near to Aldebaran; having passed the fifth of the Bull, or Bull's-eye, at forty-one minutes past three this afternoon. At nine o'clock she is thirty-five degrees fifty-eight minutes from the first of the Ram. On the 23d, she rises nearly at the same time with Aldebaran, but to the east of that star; and as she mounts the heavens, we perceive above her the second of the Bull or tip of the northern horn; and to the east of her, the sixth of the Bull, or tip of the southern horn. Under her is Orion: at nine o'clock she is forty-seven degrees twenty-two minutes from the first of the Ram. On the 24th, she rises with the seventh and twelfth of the Twins; being soon followed by the third of the Twins. As she mounts the heavens, the two first stars of the Twins on one side, and Orion on the other, will excite our attention. At nine o'clock she is twenty-five degrees from Aldebaran.

On the 25th, she rises to the east of the third of the Twins; and as she mounts the heavens, will be perceived to be in a conspicuous situation, between Orion and the two

first of the Twins, and the two first of the Lesser Dog. At nine o'clock she is thirty-six degrees forty-seven minutes from Aldebaran. On the 26th, she rises under the two first stars of the Twins; and, as she mounts the heavens, is seen to the east of the line, between the second of the Twins, and the first of the Lesser Dog. On the 27th, she rises nearly at the same time with the first of the Lesser Dog; the two first stars of the Twins being above her, and at a considerable height. Before she sets she passes over the first of the Crab; as this star suffers an occultation, which begins at thirteen minutes and a half past midnight of this day, when the star is three minutes and three quarters south of the Moon's center: and ends in the morning of the 28th, at twenty-two minutes and a quarter after one; the star being five minutes south of the Moon's center. At night of this latter day, she rises of course to the east of the two stars, each called the first of the Twins; and is followed soon after by the first of the Lion; and during the morning of the 30th, is perceived to be making its progress under the body of the Lion.

Mercury is a morning star during this month; being at his inferior conjunction on the 2d, at

half after eight in the morning: of course he cannot be seen till towards the middle of the month, and then he will be clearly discernible, as the bright harbinger of day in the south-east. He is stationary on the 11th, and at his greatest elongation on the 19th. On this day, he is above the first of the Balance; Venus and the first of the Virgin being to the west of him. The two planets and the two stars will form a beautiful groupe, about forty minutes before Sun-rise. On a few succeeding mornings, we shall see him to advantage; but his visible time above the horizon grows gradually shorter. The Moon passes him on the 7th.

Venus is a morning star during the whole of this month, having a direct motion through about thirty-seven degrees; being on the 1st under the line between the seventh and third of the Virgin, but nearest to the third. Thence she directs her progress to the eighth of the Virgin; which star she passes on the 8th, the star being two minutes north of her. She now travels rapidly to a point beyond the first of the Balance; passing the first of the Virgin on the 13th, but at a distance of between three

and four degrees. Passing between the tenth and eleventh of the Virgin on the 22d, she passes the first of the Balance on the 28th. Her brilliancy, united to that of Mercury, after the middle of the month, * will adorn the eastern hemisphere, to the south of east south-east. The Moon passes her on the 5th.

Mars is an evening star during this month; being on the meridian at fifty-seven minutes past three in the afternoon of the 1st; and at forty-three minutes past three on the evening of the 19th. His motion is direct through about twenty-three degrees; being on the 1st about a degree and a half from the eleventh of the Archer, to the east of that star; then passing under the small stars in his head; and finishing his course in the desolate region between the Archer and the Goat. The Moon passes him on the 11th.

Jupiter shines through the greater part of the night this month; being on the meridian at forty minutes past ten at night on the 1st; and at twenty-one minutes past nine on the 19th. His motion is retrograde through nearly two degrees and a half, under the small stars

in the band of the Fishes. On the 1st, he is under the sixth of this constellation. The Moon passes him on the 18th.

Saturn is in his conjunction on the 28th, at a quarter past eleven at night; and to that time he is an evening star, so near, however, the horizon at Sun-set even of the 1st, that few persons will observe him. His motion is direct from a point about two degrees from the second of the Scorpion. The Moon passes him on the 9th.

Herschell is in his conjunction on the 2d, at three quarters past seven in the morning; from which time he becomes a morning star, but too near the Sun, for some time, to be subject to our observations. On the 21st, he is within a degree of the first of the Balance, and to the west of this star; being below the line drawn from Mercury at this time to the star. The Moon passes him in the forenoon of the 6th.

The Sun's apparent diameter on the 1st is thirty-two minutes nineteen seconds; and on the 25th, thirty-two minutes twenty-nine se-

conds. The Moon's apparent diameter on the 1st is thirty minutes twenty seconds; from which time it increases to the 9th, when it is thirty-three minutes fourteen seconds: it then decreases, and is on the 25th twenty-nine minutes and a half; and thence forward it increases to the end of the month; being on the last day thirty minutes fifty-two seconds.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
VIII.	5	6	4	39	4	7		
IX.	7	9	6	42	6	10	5	36
X.	9	4	8	37	8	5	7	31
XI.	11	5	10	38	10	6	9	32
XII.	1	11	0	44	0	12	11	38
I.	3	1	2	34	2	2	1	28
II.	5	4	4	37	4	5	3	31
III.	6	53	6	26	5	54	5	20

DECEMBER, 1809.

THE experiment, made with a view to discover the change in a place of a star, owing to the motion of the Earth, was worthy of the illustrious philosophers, who conceived and executed it. How much worthier of rational beings is such an employment of their wealth and their time, than the expenditure of labour and strength, not to enlarge the bounds of science or to meliorate mankind, but to destroy each other for some idle conceit, whose absurdity will be completely felt by a succeeding generation! Judge, what must have been the surprise of these philosophers, when, instead of finding the star's place to have changed in the direction which they expected, and which it must have done if the star had been near enough—that is, within some thousand millions of miles from the Earth—it appeared to move in exactly the contrary direction.

Adieu to their expectation of discovering the

parallax of the Earth's orbit; for this was the name of the object of their enquiries; or, in plain English, the change made by the Earth's orbit; or rather the motion in its orbit. If there was a parallax, some other powerful cause must exist to counteract its effects; and where was this cause to be discovered? A variety of things suggested themselves. Their experiments were tried in different places, and on many stars. A similarity in motion was every-where observed; and a remarkable contrast was noticed in this newly-discovered change, from what would have taken place if there had been any parallax from the annual orbit. When the Earth's longitude is the same with that of a star, or the difference is a hundred and eighty degrees, then in the first case the star would appear with the greatest, in the second with the least latitude, if there was a parallax of the annual orbit: but our philosophers discovered, that in these two cases there was no change at all in latitude.

It is unnecessary at present to enter into the detail of all their plans to account for these appearances. Many were formed, and laid aside, from their insufficiency. At last it occurred to Dr. Bradley, that the motion of light must have

an effect on the appearance of the stars. By means of the moons of Jupiter, its velocity had been ascertained. The velocity of the Earth was known: it remained therefore only to consider, what would be the effect of these compound motions on the eye of the observer. The problem became strictly mathematical; and it was solved with great ingenuity. The change of position was ascertained, and the quantity of that change determined; and the results from theory corresponded exactly with those which observation had detected.

Thus, a new proof was given to the world of the Earth's motion; for if we take away this motion, there remain no means of accounting for this appearance in the heavens. Supposing the Earth to stand still, then every star is to be made to move round its real place in an ellipse, and the major axes of all the ellipses are to be the same. Allowing the motion of light and the motion of the Earth in its orbit, the changes from the true place of a star are clearly accounted for. We have a proof of the motion of light independent of that of the Earth's motion: this discovery places in a clear point of view the motion of the Earth. The mathematical solution may hereafter find a place in our volumes; but

enough has been said to excite the curiosity of my reader; and I will therefore proceed to motions with which he is better acquainted.

On the 1st the Moon rises in the morning, and is soon followed by the second of the Virgin, thus heading the five stars in triangle of this constellation. On the 2d she rises under the seventh of the Virgin. On the 3d she passes the ecliptick in her ascending node, and rises under the third of the Virgin, being nearly midway between that star and the first, as will be seen when she is higher up in the heavens. Before Sun-rise the Moon, the first of the Virgin, the first of the Balance, Venus, and Mercury near the horizon to the east of south-east, form a line to occupy the early riser. On the 4th she rises below the first of the Virgin, and on the 5th below the first of the Balance, as she passes this star at forty-three minutes past one in the morning. On the 6th, her crescent will be seen between Venus and Mercury by keen observers; and on the 7th is new Moon at twenty-one minutes past five in the morning, but without an eclipse, as she is nearly four degrees in her upright north of the equator.

On the 9th, the Moon's crescent appears in the

south-west, under the two first stars of the Archer, and with them and Mars forms a pleasing object. On the 10th she is seen above the two first stars of the Archer and Mars, as she passed between the two stars in the morning at ten minutes past seven. On the 11th, we see her under the second of the Water-bearer, and at some distance above Mars. On the 12th, she is on the meridian at seven minutes past five, the four stars in triangle of the Water-pot being directly above her. Jupiter to the east, and Mars to the west of her, may call our attention. She is nearest to the former, and directing her course to the latter planet. At six she is fifty-eight degrees, thirty-four minutes from the first of the Ram. On the 13th she is on the meridian at fifty-five minutes past five, the four stars in Square being above her, the two western on the western side, and the two eastern on the eastern side of the meridian. At six she is seventy-seven degrees forty-four minutes from Aldebaran.

On the 14th, the Moon is on the meridian, at forty-two minutes past six; the two eastern of the four stars in Square being directly above her; and Jupiter, to whom she is directing

her course, being at some distance to the east of her. At six she is sixty-four degrees forty-two minutes from Aldebaran. On the 15th, she is on the meridian at twenty-seven minutes past seven, Jupiter being now to the west of her; as she passed him at fourteen minutes past five. At nine she is fifty degrees twenty-six minutes from Aldebaran; and at fourteen minutes and a half past ten, her eastern rim touches the sixth of the Fishes, the star being nine minutes and a half south of the Moon's center; and at thirteen minutes and a half after eleven, it emerges at the distance of eight minutes and one third from the center. On the 16th, she is on the meridian at twelve minutes past eight; being directly under the three first stars of the Ram. On this day she passes the ecliptick, in her descending node; but for obvious reasons without producing an eclipse. At nine she is thirty-eight degrees two minutes from Aldebaran.

On the 17th, the Moon is on the meridian at fifty-eight minutes past eight; being nearly in the line between the first of the Ram and the first of the Whale; the former star being

above her to the west, and the latter below her to the east, of the meridian. Jupiter on the western, and the Pleiades on the eastern, side will also call our attention. At nine she is twenty-five degrees fifty-one minutes from Aldebaran. On the 18th, she is on the meridian at forty-three minutes after nine; the Pleiades being almost directly above her, and Aldebaran below her to the east of the meridian. At nine she is fifty-seven degrees forty-three minutes from the second of the Twins. On the 19th, she is on the meridian at half after ten; being between the fifth of the Bull and Aldebaran: that is, between the two eyes of the Bull. Since her first appearance this evening, she has covered two stars; for her eastern rim touched the first fourth of the Bull, at nine minutes and a half past five, when the star was five minutes and forty seconds north of her center; and at forty-one minutes and a quarter past five, her eastern rim touched the second fourth; when this star was three minutes and a quarter south of her center: the former star emerged at eleven minutes past six, being four minutes and forty seconds north of the center; and the latter star emerged at forty-seven mi-

nutes past six, being then four minutes and a half south of the center. At nine she is forty-six degrees eleven minutes from the second of the Twins.

On the 20th, the Moon is on the meridian at seventeen minutes past eleven; being almost in a line with the second of the Bull and the third of Orion; the sixth of the Bull being near to, but to the east of her. Aldebaran and the Hyades are below her to the west. At nine she is forty-four degrees twenty-eight minutes from the first of the Ram. On the 21st is full Moon, at ten at night; but without an eclipse, as she is above four degrees in her upright south of the equator. She rises near the line between the second of the Bull and the third of the Twins; and in her long day passes under the seventh and twelfth of this constellation, eclipsed by her superiour splendour; and will be seen to have made considerable approaches to the third of the Twins. At nine she is fifty-five degrees fifty-six minutes from the first of the Ram. On the 22d, she rises nearly at the same time with the third of the Twins; being

near that star, and between it and the first. At nine she is thirty-three degrees forty-nine minutes from Aldebaran.

On the 23d, the Moon rises between the two first stars of the Twins and the two first of the Lesser Dog; as will be seen when these latter stars are above the horizon. At nine she is forty-five degrees forty minutes from Aldebaran. On the 24th, she rises nearly in a line with the two first of the Twins; who are considerably above her. At nine she is fifty-seven degrees thirty-four minutes from Aldebaran. On the 25th, she rises under the two first of the Crab; having passed those stars at about eight in the morning. At nine at night, she is sixty-nine degrees thirty-three minutes from Aldebaran. On the 26th, she rises under the first of the Lion; and at nine is thirty-nine degrees fifty-five minutes from the second of the Twins. On the 27th, she rises under the body of the Lion; and is soon followed by the second of the Virgin. At nine she is fifty-one degrees and three quarters from the second of the Twins.

On the 28th, the Moon rises near the second

of the Virgin; and during the morning of the 29th passes the line drawn through this star and the second of the Lion, and produced towards her. On the 30th, she rises in the morning under the third of the Virgin, one of the five stars in Triangle; and is followed by the first, who will attract our attention to the east of her. On this day she passes the ecliptick in her ascending node, or in a motion from south to north; but for obvious reasons without producing an eclipse. On the 31st, she rises with the first of the Virgin; and during the morning is seen to recede from her towards the eleventh of this constellation; which star she passes in the course of the day.

Mercury is a morning star during this month; being in his superior conjunction on the 30th, at half past three in the afternoon: of course the opportunities of seeing him to advantage diminish every morning. He will be seen on the 1st a considerable time before Sun-rise, between south-east and south-east by east, Venus being within nine degrees and a half of him. These bright harbingers of day will excite the attention of all who breathe the pure

cold air before Sun-rise. He is near to the sixth of the Balance; and is moving towards the second of the Scorpion, which he passes on the 6th. The Moon passes him on the 6th.

Venus is a morning star; but her height above the horizon at Sun-rise is daily decreasing. On the 1st, she is to the east of the first of the Balance; and about a degree from the thirteenth, to the east of her: she proceeds with a direct motion to the second of the Scorpion, which star she passes on the 15th; and on the 20th she passes Saturn; who is only forty-four minutes from her to the south. The two planets, with Antares, or the first of the Scorpion, will form a pleasing groupe, about three quarters of an hour before Sun-rise, to those who have a good view of the horizon to the south of south-east. The Moon passes her on the 5th.

Mars is an evening star, being on the meridian on the 1st, at thirty-two minutes past three in the afternoon; and at eleven minutes past three on the 19th. He moves with a direct motion through twenty-four degrees and a half; being on the 1st under the two first stars of the Goat; and on the 14th, he passes a small

star; the star being forty-seven minutes north of him. During the latter days of the month he passes over the small stars in the tail of the Goat. The Moon passes him on the 10th.

Saturn is a morning star, but too near to the Sun, in the early part of the month, to be visible. His motion is direct through three degrees and a half. On the 20th, Venus passes him; being then only forty-four minutes south of him; and from this time the two planets, with Antares, will excite the attention of the early riser. The Moon passes him on the 15th.

Herschell is also a morning star; being seen, on the 1st, to the east of the first of the Balance; and on the 13th he is only two minutes and a half from this star; the star being to the south of him. The curious will not fail of this opportunity of making themselves acquainted with this planet; as he goes but little way further to the east of the star. The Moon passes him on the 5th.

The Sun's apparent diameter on the 1st is thirty-two minutes thirty-one seconds; and on the 19th thirty-two minutes thirty-five seconds. The Moon's apparent diameter first increases, then decreases, and lastly increases. On the 1st, it is thirty-one minutes six seconds; on the 7th, thirty-three minutes thirty-two seconds; on the 22d, twenty-nine minutes twenty-eight seconds; and at the end of the month thirty-two minutes fourteen seconds.

TABLE OF POSITIONS.

	1		8		17		25	
Pos.	h.	m.	h.	m.	h.	m.	h.	m.
IX.	5	6	4	36	3	56	3	20
X.	7	1	6	31	5	51	5	15
XI.	9	2	8	32	7	52	7	16
XII.	11	8	10	38	9	58	9	22
I.	0	58	0	28	11	48	11	12
II.	3	1	2	31	1	51	1	15
III.	4	50	4	20	3	40	3	4
IV.	7	11	6	41	6	1	5	25
V.			8	32	7	52	7	16

Thus we have noted the motions of the heavenly bodies for another year; and, as at the conclusion of my last year's work, the merits of a departed friend were the uppermost in my thoughts, it has pleased Providence to take from me another friend, who used to congratulate me on the end of my annual employment. I am now writing in his study. He listens to me no longer. His remains are entombed, but his virtues will ever live in my remembrance. My dear friend Jones was an honour to the university, in which he formed so many minds to virtue and to science. A larger sphere was enlightened by the exertions of my ever revered friend Mr. Lindsey. Educated at the same university, but at a far more distant period, he lived for some time known but to a narrow circle; and he performed the duties of a parish priest with diligence, cheerfulness, and alacrity. The patronage of the great was not wanting to remove him to a higher sphere: but in the retired walks of life he had formed his mind; not for what the world esteems to be most honourable and praiseworthy, but what became a true servant of God — obedience to his commands, with pious resignation to his will. Under these impressions, he resigned his

preferment in the church of England. He determined to adhere only to Scriptural truth, and to worship only one God — the God of his Saviour. Soon after he realised the reform originally proposed by the celebrated Dr. Clarke—a reform of far greater importance, than that of either Luther or Calvin. Dr. Clarke saw the necessity of this reform: many learned and good men wished for it; yet year after year elapsed without the desired change. Mr. Lindsey at last stept forth, and opened a place for the worship of the only true God, according to the service of the church of England; but freed from those incumbrances, which had been engrafted on it by the vain traditions of men. He gave to the public a liturgy, in which all Christians might unite — a liturgy, which omitted numberless causes of division; and by which the pious Christian might, without disturbance from the idle disputes of vain philosophy, worship the God and Father of Jesus Christ. His labours were not unsuccessful. From small beginnings a numerous congregation was formed, and he lived to witness the establishment of many societies in different parts of England, to promote the cause of that sacred truth, with which his mind was so deeply impressed. If his publick life was thus beneficial

to mankind, he was not less endeared in private life, to all with whom he had any intercourse. Mild, gentle, affable, and courteous, he strove to do good to all. Difference of opinion was not with him an occasion of strife. He lamented the injury those unhappy persons did to themselves, who will not take up the easy yoke of Christ; but burden themselves with the vain endeavour to reconcile the contradicting opinions of fallible men. His great aim was, to call all men to the Scriptures; to exhort all men to make the Scriptures the rule of their faith and actions. To his last moments the Scriptures were his delight. In them he had been exercised from his earliest youth; and in his eighty-sixth year they were the great objects of his meditations. At that advanced age he fell asleep in the Lord; for his departure was like the tranquil repose of infancy; and he left this world uttering his favourite sentiment,

WHAT GOD WILLS IS BEST.

DESCRIPTION OF THE PLATES.

THE three first plates shew the relative situations of the planets, Jupiter, Venus, and Mercury; and, that my readers may draw their path more clearly, below are given their latitudes and longitudes for several days.

JUPITER.

		Longitude.		Latitude.		
January 14	XI.	15°	56′	1°	9′	S.
20		17	8	1	9	
26		18	22	1	8	
February 1		19	39	1	7	
7		20	58	1	7	
13		22	20	1	6	
19		23	43	1	6	
25		25	7	1	6	
March 1		26	4	1	5	

VENUS.

		Longitude.		Latitude.		
January 14	XI.	3°	26′	1°	26′	S.
20		10	36	1	12	
26		17	54	0	49	
February 1		24	46	0	33	
7	XII.	1	43	0	9	
13		8	35	0	18	N.
19		15	21	0	46	
25		21	57	1	17	
March 1		28	15	1	37.	

MERCURY.

		Longitude.		Latitude.		
February 13	XI.	11°	44′	0°	13′	N.
16		15	32	0	56	
19		18	17	1	42	
22		19	46	2	27	
25		19	48	3	5	
28		18	26	3	32	
March 1		17	43	3	37.	

It is obvious to any one who consults the preceding tables, that Venus is approaching towards Jupiter from the 14th; that, on the 26th, they are very near to each other; and, from the rapid motion of Venus, she may be expected to pass him on that day. But the table gives the position of each planet for the noon of each day. It is left, therefore, to the reader, to discover how much time will elapse, from the noon of the 26th, before the planets are the nearest to each other that they can be this month. The investigation will amuse the reader, who pursues the method laid down in the volume for 1807, page 30 to 38—51 to 54—and 76 to 85.

In the three first plates, the positions of the three planets are given, for the days mentioned on the sides of each figure; the letters, J. V. and M. standing for Jupiter, Venus, and Mercury. The divisions, in which the two planets Jupiter and Venus only appear, are upon a larger scale. When Mercury appears, a smaller scale is used; as a greater space in the heavens is occupied in this case by the planets.

Plate IV.

The fourth plate represents the path of Herschell, whose motion is first direct; and we observe his first place, on the 1st of January, to the right hand of the plate. The line between the letters E. and C. represents the ecliptick, or Earth's path. On the 13th of February; he is stationary; being come to that point where he takes a turn and moves back to the 15th of July. Here he is again stationary; and turns his steps into a direct motion, in which he continues to the end of the year. The star to the west of him, at the beginning of his motion, is the eleventh of the Virgin; the other stars are in the Balance.

Plate V.

The fifth plate represents the path of Saturn, whose motion is first direct; and we notice his first place, on the 1st of January, to the right hand of the plate. The line between the letters E. and C. mark the ecliptick, or

Earth's path; to the north of which he is during the whole year. His motion is first direct, being first in the eighth, and soon in the ninth sign: he moves in this manner to the 13th of March, when he turns back, and continues retrograde to the 1st of August; he then turns, and continues progressive to the end of the year. The figures VII. and VIII. denote the number of the signs that he is distant from the equinoctial point of Aries; and, if we wish to know the number of degrees, we multiply either of these figures by 30, and add to it the degrees following the figure. Thus, on the 1st day, Saturn's place is VII. 29° 58′; that is, he is 210° and 29° 58′, or 239° 58′ from the equinoctial point in Aries. The stars he passes are chiefly in the Scorpion.

Plate VI.

The sixth plate describes the path of Jupiter; and the smallness of the degrees will point out the much greater space he passes over in the course of the year than either of the other two planets. As before, the line E. C. denotes the eliptick, to the south of which is the

planet's path. He is first progressive, and moves in this manner till the 15th of August; when he takes a turn, and is retrograde to the 10th of December; then he takes another turn, and moves with a direct motion to the end of the year. The reader who has prepared his pasteboard, earth, and planet-beads, as described in the preceding volumes, will find no difficulty in marking out the above motions upon them; and, having placed his three planets in their proper situations, will see with very little trouble the space that each must describe in the course of the year; and also the reason why, at any time, either of the planets has a direct or retrograde motion, or is stationary.

THE END.

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